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D. Taylor—

THE MEDICAL WORKS OF Dr RICHARD MEAD.

VOLUME II.

CONTAINING

A Diſcourſe on the PLAGUE; A Diſcourſe on the SMALL-POX and MEASLES; Rhazes's Treatiſe on the SMALL-POX and MEASLES; An Hiſtorical account of a new method for extracting the FOUL AIR out of ſhips, *&c.*; and, A Diſcourſe on the SCURVY.

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CONTENTS.

DISCOURSE on the PLAGUE.

Preface pag. 3,

PART I.

Of the plague in general.

CHAP. I. Of the origin and nature of the plague 22
II. Of the cauſes which ſpread the plague 40

PART II.

Of the methods to be taken againſt the plague.

CHAP. I. Of preventing infection from other countries 58
II. Of ſtopping the progreſs of the plague, if it ſhould enter our country 67
III. Of the cure of the plague 90

DISCOURSE on the SMALL-POX and MEASLES.

Preface 97
CHAP. I. Of the origin of the ſmall-pox 104
II. Of the nature and ſorts of the ſmall-pox 109
III. Of the methods of cure in the ſmall-pox 118
IV. Of accidents in the ſmall-pox 134
V. Of the inoculation of the ſmall-pox 142
VI. Of the meaſles 150

RHA-

RHAZES's TREATISE on the SMALL-POX and MEASLES.

Preface 155

CHAP. I. Of the cauſes of the ſmall-pox; and how it comes to paſs, that no mortal, except by chance here and there one, eſcapes from this diſeaſe; alſo a brief account of what Galen has mentioned concerning it 158

II. Of bodies diſpoſed to the ſmall-pox 162

III. Of the prognoſtic ſigns of the eruption of the ſmall-pox and meaſles 164

IV. Of the regimen, or cure of the ſmall-pox in general 165

V. Of preſervation from, and leſſening the diſeaſe 166

VI. Of thoſe things which haſten the eruption of the ſmall-pox 173

VII. Of taking care of the throat, eyes, *&c.* as ſoon as the puſtules have appeared 177

VIII. Of ripening the ſmall-pox 181

IX. Of drying the puſtules 182

CHAP.

CHAP. X. Of taking away the dry ſcabs and eſchars 183
XI. Of deſtroying the marks of the ſmall-pox 184
XII. Of the diet of patients in the ſmall-pox 187
XIII. Of managing the diſcharges of the belly, in the ſmall-pox 190
XIV. Of the curable and incurable ſmall-pox and meaſles 194

METHOD for extracting the FOUL AIR out of SHIPS.

Preface 198

Leters to and from Mr Sutton, relative to his invention for extracting the foul air out of ſhips; with an account of his proceedings therein 201

An account of Mr Sutton's invention and method of changing the air in the hold, and other cloſe parts of a ſhip; as communicated to the Royal Society 220

Obſervations upon Mr Sutton's invention 225

Teſtimonials of the advantages and ſucceſs of Mr Sutton's air-pipes 233

Patent granted him for this invention 239

DISCOURSE on the SCURVY 244

THE

THE

WORKS

OF

Dr RICHARD MEAD.

A DISCOURSE on the PLAGUE.

To the RIGHT HONOURABLE

JAMES CRAGGS, Eſq;

One of his Majeſty's Principal Secretaries of State.

SIR,

I Moſt humbly offer to you my thoughts concerning the prevention of the plague, which I have put together by your command. As ſoon as you were pleaſed to ſignify to me, in his Majeſty's abſence, that their Excellencies the Lords Juſtices thought it neceſſary for the public ſafety, upon the account of the ſickneſs now in France, that proper directions ſhould be drawn up to defend ourſelves

from ſuch a calamity; I moſt readily undertook the taſk, though upon ſhort warning, and with little leiſure: I have therefore rather put down the principal heads of caution, than a ſet of directions in form.

The firſt, which relate to the performing quarantines, *&c.* you, who are perfectly verſed in the hiſtory of Europe, will ſee are agreeable to what is practiſed in other countries, with ſome new regulations. The next, concerning the ſuppreſſing infection here, are very different from the methods taken in former times among us, and from what they commonly do abroad; but, I perſuade myſelf, will be found agreeable to reaſon.

I moſt heartily wiſh, that the wiſe meaſures the government has already taken, and will continue to take, with regard to the former of theſe, may make the rules about the latter unneceſſary. However, it is fit, we ſhould be always provided with proper means of defence againſt ſo terrible an enemy.

May this ſhort eſſay be received as one inſtance, among many others, of the care you always ſhew for your country; and as a teſtimony of the great eſteem and reſpect, with which I have the honour to be,

SIR,

Your moſt obedient, and

Moſt humble ſervant,

Nov. 25. 1720.

R. MEAD.

PRE-

PREFACE.

THis book having at firſt been written only as a plan of directions for preſerving our country from the plague *, was then very ſhort and conciſe. An act of parliament being immediately after made for performing quarantines, &c. according to the rules here laid down, it paſſed through ſeven editions in one year without any alterations. I then thought proper to make ſome additions to it, in order to ſhew the reaſonableneſs of the methods preſcribed, by giving a more full deſcription of this diſeaſe, and collecting ſome examples of the good ſucceſs which had attended ſuch meaſures, when they had been put in practice. At the ſame time I annexed a ſhort chapter relating to the cure of the plague; being induced thereto by conſidering how widely moſt authors have erred in preſcribing a heap of uſeleſs and very often hurtful medicines, which they recommend under the ſpecious titles of antidotes, ſpecifics, and alexipharmacs: hoping that the great reſemblance which I had obſerved between this diſeaſe and the ſmall pox, would juſtify my writing upon a diſtemper which I have never ſeen.

Indeed the ſmall-pox is a true plague, though of a particular kind, bred, as I have ſhewn all peſtilences are, in the ſame hot Egyptian climate, and brought into Aſia and Europe by the way of commerce; but moſt remarkably by the war with the Saracens, called the holy war, at the latter end of the eleventh and the beginning of the twelfth century †. Ever ſince which time the morbific ſeeds

* See the dedication. † Vid. Huet. de rebus ad eum pertinentibus, pag. 23.

of it have been preſerved in the infected cloaths and the furniture of houſes; and have broken out more or leſs in all countries, according as the hot and moiſt temperature of the air has favoured their ſpreading and the exertion of their force. The meaſles is likewiſe a plague *ſui generis*, and owes its origin to the ſame country.

I have now reviſed my little work once more: and though I cannot find any reaſon to change my mind as to any material points which regard either the preventing or the ſtopping the progreſs of infection; yet I have here and there added ſome new ſtrokes of reaſoning, and, as the painters ſay, retouched the ornaments, and heightened the colouring of the piece.

The ſubſtance of the long preface to the laſt edition is as follows.

I have inſiſted more at large upon the infection of this diſeaſe, than I could ever have thought needful at this time, after Europe has had experience of the diſtemper for ſo many ages: had I not been ſurpriſed by the late attempts of ſome phyſicians in France to prove the contrary, even while they have the moſt undeniable arguments againſt them before their eyes. In particular, I cannot but very much admire to ſee Dr Chicoyneau, and the other phyſicians, who firſt gave us obſervations on the plague, when at Marſeilles, relate, in the reflections they afterwards publiſhed upon thoſe obſervations, the caſe of a man who was ſeized with the plague, upon his burying a young woman dead of it, when no one elſe dared to approach the body; and yet to ſee them aſcribe his diſeaſe, not to his being infected by the woman, but ſolely to his grief for the loſs of her, to whom he had

had made love, and to a diarrhœa which had been ſome time upon him *. No queſtion but theſe concurred to make his diſeaſe the more violent; and perhaps even expoſed him to contract the infection: but why ſhould it be ſuppoſed, that he was not infected, I cannot imagine, when there was ſo plain an appearance of it. I am as much at a loſs to find any colour of reaſon for their denying infection in another caſe they relate, of a young lady ſeized with the plague, upon the ſudden ſight of a peſtilential tumour, juſt broke out upon her maid; not allowing any thing but the lady's ſurpriſe to be the cauſe of her illneſs †.

The truth is, theſe phyſicians had engaged themſelves in an hypotheſis, that the plague was bred at Marſeilles by a long uſe of bad aliment, and grew ſo fond of their opinion, as not to be moved by the moſt convincing evidence. And thus it moſtly happens, when we indulge conjectures inſtead of purſuing the true courſe for making diſcoveries in nature.

I know they imagine this their ſentiment to be abundantly confirmed from ſome experiments made by Dr Deidier ‡ upon the bile taken from perſons dead of the plague: which having been either poured into a wound made on purpoſe in different dogs, or injected into their veins, never failed, in many trials, to produce in them all the ſymptoms of the peſtilence, even the external ones of bubo's and carbuncles. One dog, upon which the experiment ſucceeded, had been known, for three months before, to devour greedily the corrupted fleſh of infected perſons, and pledgets

* Obſervations ſur la peſte de Marſeille, p. 38. 39. 40. † Ibid. p. 113. ‡ Vid. Philoſ. Tranſ. N° 370.

taken

taken off from peſtilential ulcers, without receiving any injury. From hence they conclude *, that this diſeaſe is not communicated by contagion, but originally bred in the body by the corruption of the bile. This corruption, they ſay, is the effect of unwholeſome food; and the bile thus corrupted, produces a thickneſs and a degree of coagulation in the blood, which is the cauſe of the plague: though this they allow to be enforced by a bad ſeaſon of the year, and the terrours of mind and deſpair of the inhabitants.

Theſe experiments are indeed curious, but fall very ſhort of what they are brought to prove. The moſt that can be gathered from them is this: That dogs do not, at leaſt not ſo readily, receive peſtilential infection from men, as men do from one another; and alſo, that the bile is ſo highly corrupted in a body infected with the plague, that, by putting it into the blood of a dog, it will immediately breed the ſame diſeaſe.

But it does not follow from hence, that the bile is the ſeat of the diſeaſe, or that other humours of the body are not corrupted as well as this. I make no queſtion but the whole maſs of blood is, in this caſe, in a ſtate of putrefaction; and conſequently that all the liquors derived from it partake of the taint.

Accordingly it appeared afterwards from ſome experiments made by Dr Couzier †, that not only the blood, but even the urine from an infected perſon, infuſed into the crural vein of a dog, communicated the plague. I will venture to affirm, that if, inſtead of bile, blood, or urine, the matter of the ulcers had

* Le journal des ſçavans, 1722, p. 279. † Vid. diſſertation ſur la contagion de la peſte. A Toulouſe, 1724.

been

been put into a wound made in the dog, it would have had at leaſt an equally pernicious effect; as may well be concluded from the inoculation of the ſmall-pox.

As to the dog's eating the corrupted fleſh and purulent matter of the patients; it ought to have been conſidered that there are ſome poiſons very powerful when mixed immediately with the blood, which will not operate in the ſtomach at all; as in particular the ſaliva of the mad dog and the venom of the viper *. And therefore Dr Deidier himſelf, ſome months after his former experiments, found that peſtiferous bile itſelf was ſwallowed by dogs without any harm †.

The right inference to be made from theſe experiments, I think, would have been this: That ſince the blood and all the humours are ſo greatly corrupted in the plague, as that dogs (though not ſo liable to catch the diſtemper in the ordinary way of infection, as men are) may receive it by a ſmall quantity of any of theſe from a diſeaſed ſubject being mixed with their blood; it may well be ſuppoſed, that the effluvia from an infected perſon, drawn into the body of one who is ſound, may be peſtiferous and productive of the like diſorder.

My aſſertion, that theſe French phyſicians have before them the fulleſt proofs of this infection, not only appears from theſe inſtances of it I have obſerved to be recorded by themſelves; but likewiſe from what Dr le Moine and Dr Baily ‡ have written, of the manner in which the plague was brought to Canour-

* Vid. mechanical account of poiſons, pag. 31.
† Vid. Philoſ. Tranſ. N° 372.
‡ Vid. lettre de Meſſieurs le Moine & Baily.

gue

gue in the Gevaudan: as alſo from an amazing inſtance they give us of the great ſubtilty of this poiſon, experienced at Marvejols; where no leſs than ſixty perſons were at once infected in a church, by one that came thither out of an infected houſe. The plague was carried from Marſeilles to Canourgue, as follows. A galley-ſlave, employed in burying the dead at Marſeilles, eſcaped from thence to the village of St Laurent de Rivedolt, a league diſtant from Correjac; where finding a kinſman, who belonged to the latter place, he preſented him with a waiſtcoat and a pair of ſtockings he had brought along with him. The kinſman returns to his village, and dies in two or three days; being followed ſoon after by three children and their mother. His ſon, who lived at Canourgue, went from thence, in order to bury the family; and, at his return, gave to his brother-in-law a cloak he had brought with him: the brother-in-law laying it upon his bed, loſt a little child which lay with him, in one day's time; and two days after, his wife; himſelf following in ſeven or eight. The parents of this unhappy family, taking poſſeſſion of the goods of the deceaſed, underwent the ſame fate.

All this abundantly ſhews how inexcuſable the foreſaid phyſicians in France are, in their oppoſing the common opinion that the plague is contagious. However, I have paid ſo much regard to them, as to inſiſt the more largely upon the proof of that contagion; leſt the opinion of thoſe who have had ſo much experience of the diſeaſe, might lead any one into an errour, in an affair of ſuch conſequence, that all my precepts relating to quarantines, and well nigh every particular part of my advice, depends upon it: for

if

if this opinion were a miſtake, quarantines, and all the like means of defence, ought to be thrown aſide as of no uſe. But as I continue perſuaded, that we have the greateſt evidence, that the plague is a contagious diſeaſe; ſo I have left, without any alteration, all my directions in reſpect to quarantines: in which, I hope, I have not recommended any thing prejudicial to trade; my advice being very little different from what has been long practiſed in all the trading ports of Italy, and in other places. Nay, were we to be more remiſs in this than our neighbours, I cannot think but the fear they would have of us, muſt much obſtruct our commerce.

But I ſhall purſue this point no farther: the rather becauſe a very learned phyſician among themſelves has ſince, both by ſtrong reaſoning and undeniable inſtances, evinced the reality of contagion *.

In a word, the more I conſider this matter, the more I am convinced that the precepts I have delivered, both with regard to the preventing the plague from coming into a country, and the treatment of it when preſent, are perfectly ſuitable to the nature of the diſtemper, and conſequently the fitteſt to be complied with. But how far, in every ſituation of affairs, it is expedient to grant the powers requiſite for putting all of them in practice, it is not my proper buſineſs as a phyſician, to determine. No doubt, but at all times theſe powers ought to be ſo limited and reſtrained, that they may never endanger the rights and liberties of a people. Indeed, as I have had no other view than the public good in this my underta-

* Aſtruc, diſſertation ſur la contagion de la peſte. A Toulouſe, 1724. 8°.

king, and the ſatisfaction of doing ſomewhat towards the relief of mankind, under the greateſt of calamities; ſo I ſhould not, without the utmoſt concern, ſee that any thing of mine gave the leaſt countenance to cruelty and oppreſſion.

But I muſt confeſs, I find no reaſon for any apprehenſions of this kind, from any thing I have advanced. For what extraordinary danger can there be, in lodging powers for the proper management of people under the plague, with a council of health, or other magiſtrates, who ſhall be accountable, like all other civil officers, for their juſt behaviour in the execution of them? Though this I muſt leave to thoſe who are better ſkilled in the nature of government. But ſure I am, that, by the rules here given, both the ſick will be provided for with more humanity, and the country more effectually defended againſt the progreſs of the diſeaſe, than by any of the methods heretofore generally put in practice, either in our own, or in other nations.

The uſage among us, eſtabliſhed by act of parliament, of impriſoning in their houſes every family the plague ſeizes on, without allowing any one to paſs in or out, but ſuch as are appointed by authority, to perform the neceſſary offices about the ſick, is certainly the ſevereſt treatment imaginable; as it expoſes the whole family to ſuffer by the ſame diſeaſe; and conſequently is little leſs than aſſigning them over to the cruelleſt of deaths; as I have ſhewn in the diſcourſe.

The methods practiſed in France are likewiſe obnoxious to great objections. Crouding the ſick together in hoſpitals can ſerve to no good purpoſe; but inſtead

inſtead thereof will promote and ſpread the contagion, and beſides will expoſe the ſick to the greateſt hardſhips. It is no ſmall part of the miſery that attends this terrible enemy of mankind, that whereas moderate calamities open the hearts of men to compaſſion and tenderneſs, this greateſt of evils is found to have the contrary effect. Whether men of wicked minds, through hopes of impunity, at theſe times of diſorder and confuſion, give their evil diſpoſition full ſcope, which ordinarily is reſtrained by the fear of puniſhment; or whether it it be, that a conſtant view of calamities and diſtreſs does ſo pervert the minds of men, as to blot out all ſentiments of humanity; or whatever elſe be the cauſe: certain it is, that at ſuch times, when it ſhould be expected to ſee all men unite in one common endeavour, to moderate the public miſery; quite otherwiſe, they grow regardleſs of each other, and barbarities are often practiſed, unknown at other times. Accordingly Diemerbroeck informs us, that he himſelf had often ſeen theſe hoſpitals committed to the charge of villains, whoſe inhumanity has ſuffered great numbers to periſh by neglect, and that ſometimes they have even ſmothered ſuch as have been very weak, or have had nauſeous ulcers difficult to cure. Inſomuch that in many places the ſick have choſe to lay themſelves in fields, in the open air, under the ſlighteſt coverings, rather than to fall into the barbarous hands of thoſe who have had the management of theſe hoſpitals *.

The rigorous reſtraints obſerved at their lines, are attended alſo with the like inconveniencies. For, by abſolutely denying a paſſage to people from infected

* Diemerbroeck de peſte, p. 120.

places, they ſubject to the ſame common ruin, both from the diſeaſe, and from the diſorders committed in ſuch places, thoſe whom their fortunes would otherwiſe furniſh with means of eſcaping: and this, no doubt, in every free country, muſt be looked upon as an unjuſt infringement of liberty, and a diminution of mens natural rights, not to be allowed.

Now, under all theſe difficulties, I cannot but with the greateſt ſatisfaction obſerve, that my precepts are well nigh, nay altogether free from them; and yet a proper regard is had to the diſeaſe. As ſoon as ever the ſick are grown numerous, I adviſe, that they be left in their houſes, without any of thoſe unmerciful reſtraints heretofore put upon them and the families they belonged to. I might, perhaps, have juſtly directed, that whenever thoſe who frequent or dwell in an infected houſe, go abroad, they ſhould be obliged to carry about them a long ſtick of ſome remarkable colour, or other viſible token, by which people may be warned from holding too free converſe with them: this being the practice on theſe occaſions, as I have heard, in ſome places. The removal of the ſick from their houſes, I adviſe only at the beginning, when it will be attended with none of the forementioned inconveniencies; but is what, for the moſt part, thoſe ſick ſhould themſelves deſire. It has hardly ever been known, when the diſeaſe did not firſt begin among the poor. Such therefore only will be ſubject to this regulation, whoſe habitations by the cloſeneſs of them are in all reſpects very incommodious for diſeaſed perſons. So that my advice chiefly amounts to the giving relief to the poor, who ſhall firſt be infected, by removing them into more convenient lodgings

lodgings than their own, where they ſhall be better provided for than at home. And the removal of them will not be attended with that danger it is natural for the unſkilful to apprehend in ſo dreadful a diſeaſe; becauſe it is every day practiſed in the ſmall-pox, with great ſafety. And whereas I have before obſerved, that people have often ſuffered in the public hoſpitals by the inhumanity of their attendants; in this caſe, little or nothing of that kind is to be feared: for I have propoſed this removal of the ſick only, at a time, when a long ſeries of calamities has not yet bred diſorders and hardneſs of heart. Nay, it may be reaſonably expected that they ſhould rather be uſed with the tendereſt care, when every one ſhall believe the ſtopping of the diſtemper, and conſequently their own ſafety, to depend upon it. And as this treatment will be both ſafe and beneficial to the ſick, ſo it will be much more evidently for the advantage of the ſound part of the family, and of thoſe who live near them. For as the poorer ſort of people ſubſiſt by their daily labour, no ſooner ſhall the plague have broke out among them, but the ſick families, and all their neighbours likewiſe, if not relieved by the public, ſhall be abandoned to periſh by want, unleſs the progreſs of the diſtemper put a ſhorter period to their lives.

This obſervation, that the plague uſually begins among the poor, was the reaſon why I did not make any difference in my directions for removing the ſick, in regard to their different fortunes, when I firſt gave my thoughts upon this ſubject: which, however, to prevent cavils, I have at preſent done; and have ſhewn what method ought to be taken, if, by ſome unuſual chance,

chance, the plague ſhould at the beginning enter a wealthy family. And, in this caſe, I have adviſed nothing which I would not moſt readily ſubmit to myſelf: for I ſhould much rather chuſe to be thus removed from my dwelling, with the diſtemper upon me to ſave my family, than they, by being ſhut up with me, ſhould be all expoſed to periſh. And as this way of treating diſeaſed families is the moſt compaſſionate that can be deviſed with any regard to the reſtraining the progreſs of the diſtemper; ſo it is ſtill much preferable to what was formerly practiſed amongſt us on other accounts. For, according to what I have adviſed, it is only required, to remove ſome few families at the beginning of the diſeaſe: whereas the method of ſhutting up houſes was continued through the whole courſe of the ſickneſs. Perhaps the plague, under this management, may not reach half a ſcore families: I have given inſtances where it has thus been ſtopt in one.

What relates to the incloſing infected places with lines, I have ſo regulated, that no body can be ſubjected to any degree of hardſhip thereby: for I have provided, that free liberty be given to every one that pleaſes, to depart from the infected place, without being put to any other difficulty, than the performance of a ſhort quarantine of about three weeks, in ſome place of ſafety. So that no one ſhall be compelled to continue in the infected town, whom his own circumſtances will not confine.

This part of my directions is not ſo general as the reſt, becauſe ſome places are too great to admit of it: which occaſioned my propoſing it with a reſtriction *.

* In theſe words, *Where it can be done.*

But

But as this is a great inconvenience to the reſt of the country, ſo it is far from being any advantage to the place thus left unguarded. For when all who leave an infected place, carry with them certificates of their having ſubmitted to ſuch quarantine, as may remove all cauſe of ſuſpicion, travelling will be much more ſafe and commodious, than otherwiſe it can be. For want of this, when the plague was laſt at London, it was difficult to withdraw from it, while the country was every where afraid of ſtrangers, and the inns on the roads were unſafe to lodge in for thoſe who travelled from the city; when it could not be known, but infection might be received in them by others come from the ſame place.

And from hence it happened, that the plague, when laſt in England, though much more moderate, and though it continued not above one year in the city of London, did yet ſpread itſelf over a great part of England, getting into Kent, even as far as Dover; into Suſſex, Hampſhire, Dorſetſhire, Eſſex, Suffolk, Norfolk, Cambridgeſhire, Northamptonſhire, Warwickſhire, Derbyſhire, and, to mention no more, as far as Newcaſtle *.

Thus, as I have examined through the courſe of the following treatiſe, with all poſſible care, into the agreement of my precepts with the nature of the plague; ſo I have now conſidered how far they can conveniently be put in practice.

But it is time to have done with a ſubject by no means agreeable.

I ſhall therefore conclude all I have to ſay upon this matter, with a paper well deſerving peruſal, which

* Vid. the gazettes of the years 1665 and 1666.

is

is come to my hands, ſince the following ſheets were finiſhed; and therefore too late to be made uſe of in its proper place: for which reaſon I ſhall give it here entire. This paper contains the methods taken by his late Majeſty, when the plague, in the year 1712, had entered his dominions in Germany. It was delivered to me from Mr Backmeiſter, the ſecretary at Hanover to his Majeſty for the German affairs, who was the perſon that iſſued out the orders that were given. This relation I requeſted from the ſecretary, being deſirous to know how far the meaſures then taken, agreed with my directions; becauſe I had been informed, that they were very ſucceſsful. And I have the ſatisfaction to find them very conformable to my precepts; and that they had ſo much the deſired effect, as to ſtop the plague from ſpreading beyond the ſmall number of towns and villages recited at the beginning of the paper.

HANOVER, *Feb.* 10. N. S. 1722.

IN 1712 and 1713, the plague raged in theſe parts, at the following places.

TOWNS.

Lunenbourg, Zell, Haarbourg, twice.

VILLAGES.

Nienfeldt,	Bienenbuttel,	Brinckem,
Holdenſtedt,	Achem,	Goldenſtedt,
Melle,	Trebel,	Fallingboſtel.

In the laſt place, three labouring men, who had made their eſcape from Hamburg, got into a barn in the night, and were found dead there the next morning,

morning, with marks of the plague upon them: but the progreſs of the infection was ſtopt by burning the barn.

As ſoon as any village was infected, the firſt thing done was to make a line round it, thereby to hinder the inhabitants from communicating with others. Thoſe who were thus ſhut up, were immediately furniſhed with proviſions: a phyſician was ſent to them; and eſpecially ſome ſurgeons; a miniſter to officiate particularly to perſons infected; a nurſe, buriers, *&c.*

The principal management of this whole affair conſiſted in two things: 1. In ſeparating the ſick from the ſound; and, 2. In cleaning well the houſes which had been infected.

When any perſon was taken ill, he was obliged to leave his lodging, and retire into a lazaretto, or hoſpital, built for that purpoſe. The other perſons who appeared to be well in the ſame houſe, were obliged, when it was practicable, to ſtrip themſelves in the night quite naked, to put on other cloaths, which were provided for them, and to go to perform quarantine in a houſe appointed for it, after having burnt the cloaths they had put off. Perſons were made to change their cloaths, and thoſe they put off were burnt, as often as was judged neceſſary: for example, this was done when thoſe who had recovered their health, came out of the lazaretto and went into quarantine; and likewiſe, when (after the diſeaſe was eaſed) the women who attended the ſick, the buriers, and ſurgeons, went into quarantine.

In ſummer, ordinary barracks (or huts) were made for thoſe of the common people, who were obliged

to quit infected houſes: which barracks were afterwards burnt, when they had been made uſe of.

As ſoon as the people were come out of an infected houſe, it was nailed up, and centinels were poſted there, that nothing might be ſtolen out of it. In the country, when ſuch a houſe was not of very great value, and it might be done without danger, it was burnt, and the loſs was made good to the owner, at the expenſe of the public. But in towns, where this could not be done, without the hazard of burning the town, men were hired to go into the houſes, and bring into the court-yard, or before the houſe, whatever goods they found in it ſuſceptible of contagion, and there burn them: but to prevent the fright which this might raiſe among the neighbours, ſuch goods were ſometimes put into the cart uſed to carry off dead bodies, and ſo conveyed out of the town and burnt. At firſt the method taken, was only to bury ſuch goods deep in the ground: but it was found by ſeveral examples, that they were dug up again, and that the infection was thereby renewed. Before people were paid for their houſes and effects that were burnt, it was diſcovered that they often laid ſome of their goods out of the way, and that the contagion was ſpread by them: but after they came to be paid what was reaſonable, by the public, they willingly let all be burnt, without concealing any thing.

In ſummer, the cattle were left abroad, and the inhabitants, who had not the plague in their houſes, were obliged to look after them: in winter, the ſound perſons were obliged, before they left an infected houſe, to kill the cattle belonging to it, and to bury them

them ten feet deep in the ground near the houſe.

So far the former preface.

I Think it now proper to take notice, that an act of parliament (as above mentioned in this preface) formed upon the precepts here delivered, having been paſſed on December 8. 1720, the two laſt clauſes in the ſaid act, relating to the removing of ſick perſons from their habitations, and the making of lines about places infected, were, on October 19. of the following year, repealed.

This looks as if the rules preſcribed were not right and juſt: I muſt therefore obſerve, in juſtification of myſelf, that this was not the caſe. Nothing was urged in that repeal againſt the reaſonableneſs of the directions in themſelves, more than in theſe words: "That the execution of them might be very grie-"vous to the ſubjects of this kingdom." But this I have proved to be quite otherwiſe.

The truth of the matter is this: Some great men, both of the Lords and Commons, who were in the oppoſition to the court, objected that the miniſtry were not to be intruſted with ſuch powers, leſt they ſhould abuſe them; ſince they might, upon occaſion, by their officers, either remove or confine perſons not favoured by the government, on pretence that their houſes were infected.

Vain and groundleſs as theſe fears were, yet the clamours induſtriouſly raiſed from them were ſo ſtrong, that a great officer in the ſtate thought fit to oblige his enemies by giving way to them: and though a motion made in the houſe of Commons for repealing theſe two clauſes had juſt been rejected; yet, upon

making the ſame in the houſe of Lords, with his conſent, the thing was done.

Whether private or public conſiderations had the greater ſhare in bringing about this compliance, I will not determine. Such counter-ſteps will happen in a government, where there is too much of faction, and too little of a public ſpirit. This I very well remember, that a learned prelate, now dead, who had more of political than of Chriſtian zeal, and was one who made the loudeſt noiſe about the quarantine-bill, frankly owned to me in converſation, that though the directions were good, yet he and his friends had reſolved to take that opportunity of ſhewing their diſaffection to the miniſtry.

But, after all, it contributed not a little to the carrying this point, that the plague was now ceaſed at Marſeilles, and a ſtop put to its progreſs in the provinces. And I cannot but take notice, that this laſt good ſervice was done by the ſame method, which, though in a more moderate way, I have here propoſed. For it is well known, that the regent of France did at laſt ſet bounds to the contagion by lines and barriers guarded by ſoldiers: which wiſe reſolution ſaved not only his own but other countries from the ſpreading of a diſeaſe, which ſeems to have been of as violent a kind as ever was brought into Europe.

However, if there were any ſeverity in orders of this kind, every man ought to conſider himſelf as a member of the ſociety; by the laws of which as he receives many advantages, ſo he gives up ſomewhat of his own private rights to the public: and muſt therefore be perfectly ſatisfied with whatever is found neceſſary for the common good; although it may,

on

on particular occaſions, bring upon him ſome inconveniencies and ſufferings.

Salus populi ſuprema lex eſt.

Does any body complain of ill uſage upon his houſe being ordered to be blown up, to ſtop the progreſs of a fire which endangers the whole ſtreet; when he reflects that his neighbour, who by this means eſcapes, muſt have ſuffered the ſame loſs for his ſake, had it ſo happened that each had been in the other's habitation?

But in truth, there is no cruelty, but on the contrary real compaſſion in theſe regulations, with the limitations I have made: and I am fully perſuaded, that whoever with judgment conſiders the nature of this diſeaſe, will eaſily ſee that the rules here laid down are not only the beſt, but indeed the only ones that can effectually anſwer the purpoſe. And therefore I ſhould not doubt but that, if this calamity (which God avert!) ſhould be brought into our country, even the voice of the people would cry out for help in this way: notwithſtanding wrong notions of their liberties may ſometimes over poſſeſs their minds, and make them, even under the beſt of governments, impatient of any reſtraints.

PART

PART I.

OF THE PLAGUE IN GENERAL.

CHAP. I.

Of the origin and nature of the plague.

MY deſign in this diſcourſe being to propoſe what meaſures I think moſt proper to defend the nation againſt the plague, and for this end to conſider the nature of peſtilential contagion as far as is neceſſary to ſet forth the reaſonableneſs of the precepts I ſhall lay down; before I proceed to any particular directions, I ſhall inquire a little into the cauſes whence the plague ariſes, and by what means the infection of it is ſpread.

In the moſt ancient times, plagues, like many other diſeaſes, were looked upon as divine judgments ſent to puniſh the wickedneſs of mankind: and therefore the only defence ſought after was by ſacrifices and luſtrations to appeaſe the anger of incenſed heaven *.

How much ſoever may be ſaid to juſtify reflections of this kind, ſince we are aſſured from ſacred hiſtory, that divine vengeance has been ſometimes executed by plagues; yet it is certain, that ſuch ſpeculations puſhed too far, were then attended with ill conſequences, by obſtructing inquiries into natural cauſes, and encouraging a ſupine ſubmiſſion to thoſe e-

* Celſus de medic. in præfat. Morbos ad iram deorum immortalium relatos eſſe, et ab iiſdem opem poſci ſolitam.

vils;

vils; againſt which the infinitely good and wiſe author of nature has in moſt caſes provided proper remedies.

Upon this account, in after-ages, when the profeſſion of phyſic came to be founded upon the knowledge of nature, Hippocrates ſtrenuouſly oppoſed this opinion, that ſome particular ſickneſſes were divine, or ſent immediately from the gods; and affirmed, that no diſeaſes came more from the gods than others, all coming from them, and yet all owning their proper natural cauſes: that the ſun, cold, and winds were divine; the changes of which, and their influences on human bodies, were diligently to be conſidered by a phyſician *.

Which general poſition this great author of phyſic intended to be underſtood with reſpect to plagues as well as other diſtempers: how far he had reaſon herein, will in ſome meaſure appear, when we come to ſearch into the cauſes of this diſeaſe.

But in order to this inquiry, it will be convenient, in the firſt place, to remove an erroneous opinion ſome have entertained, that the plague differs not from a common fever in any thing beſides its greater violence. Whereas it is very evident, that ſince the ſmall-pox and meaſles are allowed to be diſtempers diſtinct in ſpecie from all others, on account of certain ſymptoms peculiar to them; ſo, for the ſame reaſon, it ought to be granted, that the plague no leſs differs in kind from ordinary fevers: for there are a ſet of diſtinguiſhing ſymptoms as eſſential to the peſtilence, as the reſpective eruptions are to the ſmall-pox or meaſles; which are indeed (as I have men-

* Libr. de morbo ſacro; et libr. de aëre, locis, et aquis.

tioned

tioned in the preface) each of them plagues of a particular kind.

As the ſmall-pox diſcharges itſelf by puſtules raiſed in the ſkin; ſo in the plague the noxious humour is thrown out either by tumours in the glands, as by a parotis, bubo, and the like; or by carbuncles thruſt out upon any part of the body. And theſe eruptions are ſo ſpecific marks of this diſtemper, that one or other of them is never abſent: unleſs through the extreme malignity of the diſeaſe, or weakneſs of nature, the patient ſinks, before there is time for any diſcharge to be made this way; that matter, which ſhould otherwiſe have been caſt out by external tumours, ſeizing the viſcera, and producing mortifications in them.

Sometimes indeed it happens, by this means, that theſe tumours in the glands, and carbuncles, do not appear; juſt as a bad kind of the ſmall-pox in tender conſtitutions ſometimes proves fatal before the eruption, by a diarrhœa, hæmorrhage, or ſome ſuch effect of a prevailing malignity.

The French phyſicians having diſtinguiſhed the ſick at Marſeilles into five claſſes, according to the degrees of the diſtemper, obſerved bubo's and carbuncles in all of them, except in thoſe of the firſt claſs, who were ſo terribly ſeized, that they died in a few hours, or at fartheſt in a day or two, ſinking under the oppreſſion, anxiety, and faintneſs, into which they were thrown by the firſt ſtroke of the diſeaſe; having mortifications immediately produced in ſome of the viſcera, as appeared upon the diſſection of their bodies *,

* Obſervat. et reflex. touchant la nature, &c. de la peſte de Marſeilles, pag. 47. et ſuiv.

And

And this obſervation of the French phyſicians, which agrees with what other authors have remarked in former plagues, fully proves, that theſe eruptions are ſo far from being cauſed ſolely by the greater violence of this diſeaſe, than of other fevers, that they are only abſent, when the diſtemper is extraordinary fierce; but otherwiſe they conſtantly attend it, even when it has proved ſo mild, that the firſt notice the patient has had of his infection, has been the appearance of ſuch a tumour; as, beſides theſe French phyſicians, other authors of the beſt credit have aſſured us. From whence we muſt conclude, that theſe eruptions are no leſs a ſpecific mark of this diſeaſe, than thoſe are by which the ſmall-pox and meaſles are known and diſtinguiſhed. And as in the firſt claſs of thoſe attacked with the plague, ſo likewiſe in theſe two diſtempers we often find the patient to die by the violence of the fever, before any eruption of the puſtules can be made.

This circumſtance of the plague being mortal before any eruptions appeared, was attended with a great misfortune. The phyſicians and ſurgeons appointed to examine the dead bodies, finding none of the diſtinguiſhing marks of the diſeaſe, reported to the magiſtrates that it was not the plague; and perſiſted in their opinion, till one of them ſuffered for his ignorance, and himſelf, with part of his family, died by the infection: this aſſurance having prevented the neceſſary precautions *.

And this in particular ſhews us the difference between the true plague, and thoſe fevers of extraordinary malignity, which are the uſual forerunners of it,

* Journal de la contagion à Marſeilles, p. 6.

and are the natural conſequence of that ill ſtate of air we ſhall hereafter prove to attend all plagues. For ſince all thoſe fevers from which people recover without any diſcharge by tumours in the glands, or carbuncles, want the characteriſtic ſigns, which have been ſhewn to attend the ſlighteſt caſes of the true plague; we cannot, upon any juſt ground, certainly conclude them to be a leſs degree only of that diſtemper: but, as far as appears, they are of a different nature, are not ordinarily contagious like the plague, nor yet have any ſuch neceſſary relation to it, but that ſuch fevers do ſometimes appear, without being followed by a real peſtilence.

On the other hand, I would not be underſtood to call every fever a plague, which is followed by eruptions reſembling thoſe here mentioned: for as every boil or puſtule which breaks out upon the ſkin, is not an indication of the ſmall-pox, nor every ſwelling in the groin a venereal bubo; ſo there are carbuncles not peſtilential, and other fevers, beſides the plague, which have their criſis by tumours and abſceſſes, and that ſometimes even in the parotid or other glands. There is indeed uſually ſome difference between theſe ſwellings in the plague, and in other fevers, eſpecially in the time of their coming out: for in the plague they diſcover themſelves ſooner than in moſt other caſes. But the principal difference between theſe diſeaſes is, that the plague is infectious, the other not; at leaſt not to any conſiderable degree.

And this leads me to another character of this diſeaſe, whereby it is diſtinguiſhed from ordinary fevers, which is the contagion accompanying it. This is a very ancient obſervation. Thucydides makes it a part

of

of his deſcription of the plague at Athens *; and Lucretius, who has almoſt tranſlated this deſcription of Thucydides, dwells much upon it †. Ariſtotle makes it one of his problems ‡, how the plague in-

* Lib. 2. Ὅτι ἕτερος ἀφ' ἑτέρου, θεραπείας ἀναπιμπλάμενοι, ὥσπερ τὰ πρόβατα ἔθνησκον· καὶ τὴν πλείστον φθόρον τοῦτο ἐνεποίει· ἔτι γὰρ μὴ θέλοιεν διδιότες ἀλλήλοις προσιέναι, ἀπαλλυντο ἔρημοι, καὶ οἰκίαι πολλαὶ ἐκενώθησαν ἀπορίᾳ τοῦ θεραπεύσοντος· ὅτε προσοίοιν, διεφθείροντο, καὶ μάλιστα οἱ ἀρετῆς τι μεταποιούμενοι. The beginning of this paſſage, as it here ſtands, though it is found thus in all the editions of Thucydides, is certainly faulty, θεραπείας ἀναπιμπλάμενοι being no good ſenſe. The ſentence I ſhall preſently cite from Ariſtotle ſhews that this may be rectified only by removing the comma after ἑτέρου, and placing it after θεραπείας; for προσαναπίμπλημι in Ariſtotle abſolutely uſed ſignifies to infect. With this correction, the ſenſe of the place will be as follows. The people took infection by their attendance on each other, dying like folds of ſheep. And this effect of the diſeaſe was the principal cauſe of the great mortality: for either the ſick were left deſtitute, their friends fearing to approach them, by which means multitudes of families periſhed without aſſiſtance; or they infected thoſe who relieved them, and eſpecially ſuch whom a ſenſe of virtue and honour obliged moſt to their duty.

The ſenſe here aſcribed to the word ἀναπίμπλημι, is confirmed yet more fully by a paſſage in Livy, where he deſcribes the infection attending a plague or camp-fever, which infeſted the armies of the Carthaginians and Romans at the ſiege of Syracuſe, in ſuch words, as ſhew him to have had this paſſage of Thucydides in view; for he ſays, *aut neglecti deſertique, qui incidiſſent, morerentur; aut aſſidentes curanteſque eadem vi morbi repletos ſecum traherent.* Lib. xxv. c. 26.

† Lib. vi. ver. 1234.

———nullo ceſſabant tempore apiſci
Ex aliis alios avidi contagia morbi.

Et ver. 1241.

Qui fuerant autem præſto, contagibus ibant.

‡ Sect. 1. Διὰτί πόλις ὁ λοιμὸς μόνη τῶν νόσων μάλιστα τὰς πλησιάζουσας τοῖς θεραπευομένοις προσαναπίμπλησι;

fects thoſe who approach to the ſick. And what is of more conſequence, Galen himſelf is very clear in it *; for he has theſe words: ὅτι συνδιατίθεσθαι τοῖς λαιμῶττουσιν ἐπισφαλές, ἀπολαῦσαι γὰρ κίνδυνος, ὥσπερ ψώρας τινὸς, &c. that it is unſafe to be about thoſe who have the plague, for fear of catching it, as in the itch, &c. Indeed this is a thing ſo evident, that we find it at preſent the current opinion of all mankind, a very few perſons only excepted, who have diſtinguiſhed themſelves by their ſingularity in maintaining the oppoſite ſentiment. And it is ſomething ſtrange that any one ſhould make a queſtion of a thing ſo obvious, which is proved ſufficiently by one property only of the diſeaſe, that whenever it ſeizes one perſon in a houſe, it immediately after attacks the greateſt part of the family. This effect of the plague has been ſo remarkable at all times, that whoever conſiders it well, cannot poſſibly, I think, have any doubt remaining, or require any ſtronger argument to convince him, that the diſeaſe is infectious. For this very reaſon the ſmall-pox and meaſles are generally allowed to be contagious; becauſe it is obſerved, that when either of theſe diſeaſes is got among a family, it uſually ſeizes ſucceſſively the greateſt part of that family, who have not had it before; at leaſt, if ſuch in the family hold free communication with the ſick. And by the ſame argument the plague muſt be concluded to be infectious likewiſe. It cannot be pretended, that this is occaſioned in the plague from this only, that the found perſons are rendered more than ordinarily obnoxious to the unhealthy air, or whatever be the common cauſe of the diſeaſe, by being put into

* Περὶ διαφορᾶς πυρετῶν, βιβ. α.

fear

fear and diſpirited, upon ſeeing others in the ſame houſe taken ſick: for if this were the caſe, children, who are too young to have any apprehenſions upon this account, would eſcape better than others, the contrary of which has been always experienced.

It is true, ſome have not been attacked by the diſeaſe, though conſtantly attending about the ſick. But this is no objection againſt what is here advanced: for it is as eaſily underſtood how ſome perſons, by a particular advantage of conſtitution, ſhould reſiſt infection, as how they ſhould conſtantly breathe a noxious air without hurt. An odd obſervation of Diemerbroeck deſerves notice in this place: That part of a family removed into a town free from the plague, was obſerved by him to be taken ill of it ſoon after the part left behind in the diſeaſed town fell ſick: which certainly would ſcarce have happened, unleſs a communication between the healthy and the ſick, by letters or otherwiſe, was capable of cauſing it *. Of the ſame nature is a circumſtance recorded by Evagrius of the plague, which he deſcribes, and what, he owns, ſurpriſed him very much: that many of thoſe who left infected places, were ſeized with the plague in the towns to which they had retired, while the old inhabitants of thoſe towns were free from the diſeaſe †. But to multiply proofs of a thing ſo evident is needleſs; innumerable are at hand, and ſeveral will occaſionally occur in the following parts of this diſcourſe, when we come to ſpeak in particular of the ways by which this infection is conveyed about. I ſhall therefore ſay no more in this place, but only, that all the appear-

* De peſte, c. 4. annot. 6. † Evagrii hiſtor. eccleſ. lib. iv. c. 29.

ances

ances attending this diſeaſe are very eaſily explained upon this principle, and are hardly to be accounted for upon any other. We learn from hence the reaſon why when the plague makes its firſt appearance in any place, though the number of ſick is exceeding ſmall, yet the diſeaſe uſually operates upon them in the moſt violent manner, and is attended with its very worſt ſymptoms. Now, was the diſeaſe produced not by imported contagion, but from ſome cauſe, which had its original in the diſeaſed place, and conſequently from a cauſe gradually bred, the contrary muſt happen: the diſeaſed would at firſt not only be few in number, but their ſickneſs likewiſe more moderate than afterwards, when the morbific cauſes were raiſed to their greateſt malignity. From the ſame principle we ſee the reaſon, why people have often remained in ſafety in a diſeaſed town, only by ſhutting themſelves up from all communication with ſuch as might be ſuſpected of giving them the diſeaſe. When the plague was laſt in England, while it was in the town of Cambridge, the colleges remained entirely free by uſing this precaution. In the plague at Rome, in the years 1656 and 1657, the monaſteries and nunneries, for the moſt part, defended themſelves by the ſame means *: whereas at Naples, where the plague was a little before, theſe religious houſes, from their neglect herein, did not eſcape ſo well †. Nay the infection entered none of the priſons at Rome ‡, though the naſtineſs of thoſe places expoſes them very much. But, to avoid prolixity, I ſhall give only one inſtance more. I think it cannot be explained in a-

* Gaſtaldi de avertenda et profligandâ peſte, p. 117.
† Ibid. p. 118. ‡ Ibid. p. 117.

ny

ny other reaſonable manner, how the laſt plague in the city of London, which broke out in the pariſh of St Giles's in the fields towards the latter end of the year 1664, ſhould lie aſleep from Chriſtmas to the middle of February, and then break out again in the ſame pariſh; and after another long reſt till April, ſhew itſelf again in the ſame place *.

To proceed: Whoever examines the hiſtories of plagues in all times, which have been deſcribed with any exactneſs, will find very few that do not agree in theſe eſſential marks, whereby the plague may be diſtinguiſhed from other fevers. I confeſs an inſtance or two may be found to the contrary: perhaps the hiſtory of our own country furniſhes the moſt remarkable of any †. But examples of this kind are ſo very rare, that I think it muſt be concluded, that the plague is uſually one and the ſame diſtemper.

In the next place, I ſhall endeavour to ſhew, that the plague has always the ſame original, and is brought from Africa, the country which has entailed upon us two other infectious diſtempers, the ſmall-pox and meaſles. In all countries indeed epidemic diſeaſes extraordinarily mortal, are frequently bred in jails, ſieges, camps, &c. which authors have often in a large ſenſe called peſtilential: but the true plague, which is attended with the diſtinguiſhing ſymptoms before deſcribed, and which ſpreads from country to country, I take to be an African fever bred in Æthiopia or Egypt, and the infection of it carried by trade into the other parts of the world.

It is the obſervation of Pliny, that the peſtilence

* See bills of mortality for the year 1665. † The ſweating ſickneſs.

always

always travels from the ſouthern parts of the world to the weſtern, that is, in his phraſe, into Europe *. And the moſt accurate accounts in all times of this diſeaſe, where-ever it has raged, bring it from Africa. Thucydides †, in his admirable deſcription of the famous plague of Athens, ſays, that it began in Upper Æthiopia, then came into Egypt, from whence it was ſpread firſt into Perſia, and afterwards into Greece.

There is in all ancient hiſtory no account of any plague ſo dreadful as that which broke out at Conſtantinople in the time of the Emperour Juſtinian, A. D. 543. This is ſaid to have ſpread its infection over all the earth, and to have laſted fifty-two years. The hiſtory of it is very well told by Evagrius ‡, and yet more learnedly by Procopius ‖: and they both obſerve, that the diſtemper had its birth in Æthiopia or Egypt.

This is likewiſe agreeable to the modern relations of travellers and merchants from Turky, who generally inform us, that the frequent plagues which depopulate that country, are brought thither from the coaſt of Africa; inſomuch that at Smyrna, and other ports of that coaſt, they often know the very ſhip which brings it. And, in theſe latter ages, ſince our trade with Turky has been pretty conſtant, the plagues in theſe parts of Europe have evidently been brought from thence.

The late plage in France came indiſputably from Turky, as I ſhall particularly ſhew in ſome of the following pages. The plague which broke out at

* Nat. hiſt. lib. vii. c. 50. † Hiſtor. lib. ii. ‡ Hiſt. eccleſiaſt. lib. iv. c. 29. ‖ De bello Perſico, lib. ii. c. 22.

Dantzic

Dantzic in the year 1709, and ſpread from thence to Hamburg, Copenhagen, and other cities in the north, made its way thither from Conſtantinople through Poland, &c. And the laſt plague in this city, if we may believe Dr Hodges, had the ſame original, being brought to us from Holland, but carried to them by cotton imported from Turky *.

The greateſt mortality that has happened in latter ages, was about the middle of the fourteenth century, when the plague ſeized country after country for five years together †. In the year 1346 it raged in Egypt, Turky, Greece, Syria, and the Eaſt Indies; in 1347 ſome ſhips from the Levant carried it to Sicily, Piſa, Genoa, &c. in 1348 it got into Savoy, Provence, Dauphiny, Catalonia, and Caſtile, &c. in 1349 it ſeized England, Scotland, Ireland, and Flanders; and the next year Germany, Hungary, and Denmark: and in all places where it came, it made ſuch heavy deſtruction, that it is ſaid to have diſpeopled the earth of more than half its inhabitants ‡. Now, ſince Africa had a ſhare of this plague in the very beginning, I queſtion not but it had its firſt riſe in that country; and not in China, as M. Villanni, in his hiſtory of thoſe times, relates from the report of Genoeſe ſeamen, who came from thoſe parts, and ſaid it was occaſioned there by a great ball of fire, which either burſt out of the earth, or fell down from heaven ‖. But this relation is ſo very incredible, that I cannot think we ought at all to rely upon it: ſee-

* Vid. Hodges de peſte. † Vid. iſtorie di Matteo Villanni, l. i. c. 2. ‡ Mezeray hiſt. de France, tom. i. p. 798. ‖ Villanni, loco citato.

ing we have no inſtance of a plague, which was originally bred in that country.

It is very remarkable, that the ſeveral countries of Europe have always ſuffered more or leſs in this way, according as they had a greater or leſſer commerce with Africa, or with thoſe parts of the eaſt that have traded thither. Which obſervation, by the by, may help to ſolve a difficulty concerning the great increaſe of people among the northern nations in ancient times, more than at preſent; for in thoſe ages, having no communication at all with Africa, they were not waſted with plagues, as they have been ſince.

As the people of Marſeilles, from the firſt foundation of their city by the Phoceans, were famous for trade, and made long voyages ſouthwards on the African coaſt *; ſo they have in all times been very liable to the plague. A French author †, in a hiſtory of the late plague at Marſeilles, reckons up twenty plagues that have happened in that city; notwithſtanding it is by its ſituation one of the moſt healthy and pleaſant places in France, and the leaſt ſubject to epidemic diſtempers. But if we had no records of this in hiſtory, an odd cuſtom among them, mentioned in antiquity ‡, of the way they made uſe of to clear themſelves from this diſtemper, would be a proof of it. Their manner at ſuch times was, that ſome one poor man offered himſelf to be maintained at the public expenſe with delicate food for a whole

* Vid. Huet. hiſtoire du commerce des anciens, p. 88.
† Relation hiſtorique de tout ce qui s' eſt paſſé à Marſeille pendant la derniere peſte. ‡ Vid. Serv. comment. in Virgil. Æneid. lib. iii. ver. 57.

year:

year: at the end of which he was led about the city dreſſed in conſecrated garments and herbs; and being loaded with curſes as he went along, that the evils of the citizens might fall upon him, he was at laſt thrown into the ſea *.

Agreeable to this remark upon trade is the obſervation of Procopius in his forecited hiſtory, that the plague was always found to ſpread from maritime places into the inland countries: which has ever ſince been confirmed by experience.

Having ſhewn this diſeaſe to be a diſtemper of a diſtinct ſpecies, and to take its riſe only in Africa; we muſt next ſeek for its cauſe in that country, and no where elſe. We ought therefore to conſider, what there is peculiar to that country, which can reaſonably be ſuppoſed capable of producing it. Wherefore I ſhall briefly ſet down as much as ſerves for this purpoſe of the ſtate of Grand Cairo in Egypt, and of Æthiopia, the two great ſeminaries of the plague;

* This was a kind of expiatory ſacrifice, as the ſcapegoat among the Jews, Lev. xvi. And the wretches thus devoted to die for the ſins of the people were called καθάρματα, purgations. Vid. Ariſtophan. in Plut. ver. 454. & in Equit. ver. 1133. & Scholiaſt. ib. Suidas adds, that when the ſacrificed perſon was caſt into the water, theſe words were pronounced, Περίψημα ἡμῶν γενοῦ, Be thou our cleanſing. And I obſerve, by the by, that the apoſtle Paul, 1 Cor. iv. 13. alluding very probably to this wicked cuſtom, makes uſe of both theſe words, where ſpeaking of himſelf in the plural number, he ſays, Ὡς περικαθάρματα τοῦ κόσμου ἐγενήθημεν, πάντων περίψημα; for ſome of the beſt MSS. inſtead of Ὡς περικαθάρματα, read ὥσπερ, or ὥσπερεὶ καθάρματα; that is, We have been looked upon as wretches fit only to be ſacrificed for the public good, and caſt out of the world by way of atonement for the ſins of the whole ſociety.

travellers relating that theſe countries are more infeſted with it than moſt other parts of Africa.

Grand Cairo is crouded with vaſt numbers of inhabitants, who for the moſt part live very poorly and naſtily; the ſtreets are very narrow, and cloſe: it is ſituate in a ſandy plain at the foot of a mountain, which by keeping off the winds, that would refreſh the air, makes the heats very ſtifling. Through the midſt of it paſſes a great canal, which is filled with water at the overflowing of the Nile; and after the river is decreaſed, is gradually dried up: into this the people throw all manner of filth, carrion, &c. ſo that the ſtench which ariſes from this, and the mud together, is inſufferably offenſive *. In this poſture of things, the plague every year conſtantly preys upon the inhabitants; and is only ſtopt, when the Nile, by overflowing, waſhes away this load of filth; the cold winds, which ſet in at the ſame time, lending their aſſiſtance, by purifying the air.

In Æthiopia, thoſe prodigious ſwarms of locuſts, which at ſome times cauſe a famine, by devouring the fruits of the earth, unleſs they happen to be carried by the winds clear off into the ſea, are obſerved to entail a new miſchief upon the country, when they die and rot, by raiſing a peſtilence †; the putrefaction being heightened by the exceſſive intemperance of the climate, which is ſo very great in this country, that it is infeſted with violent rains at one ſeaſon of the year, for three or four months together ‡. And it is par-

* Vid. le Brun voyage au Levant, c. xxxviii.

† Vid. Ludolf. hiſtor. Æthiop. lib. i. c. 13. & D. Auguſt. de civitat. Dei, lib. iii. c. ult. ‡ Vid. Ludolf. hiſtor. Æthiop. lib. i. c. 15. & comment.

ticularly

ticularly obſerved of this country, that the plague uſually invades it, whenever rains fall during the ſultry heats of July and Auguſt *, that is, as Lucretius expreſſes it, when the earth is

Intempeſtivis pluviiſque et ſolibus icta †.

Now, if we compare this laſt remark of the intemperance of the climate in Æthiopia, with what the Arabian phyſicians ‡, who lived near theſe countries, declare, that peſtilences are brought by unſeaſonable moiſtures, heats, and want of winds; I believe we ſhall be fully inſtructed in the uſual cauſe of this diſeaſe. Which, from all theſe obſervations compared together, I conclude to ariſe from the putrefaction ſo conſtantly generated in theſe countries, when that is heightened and increaſed by the ill ſtate of air now deſcribed; and eſpecially from the putrefaction of animal ſubſtances.

It is very plain, that animal bodies are capable of being altered into a matter fit to breed this diſeaſe: becauſe this is the caſe of every one who is ſick of it, the humours in him being corrupted into a ſubſtance which will infect others. And it is not improbable, that the volatile parts with which animals abound, may in ſome ill ſtates of air in the ſultry heats of Africa be converted by putrefaction into a ſubſtance of the ſame kind: ſince, in theſe colder regions, we ſometimes find them to contract a greater degree of acrimony than moſt other ſubſtances will do by putrefying, and alſo more dangerous for men to come within the reach of their action; as in thoſe perni-

* J. Leo hiſt. Afric. lib. i. † Lib. vi. ver. 1100.
‡ Rhaſ. et. Avicen.

cious,

cious, and even poiſonous juices, which are ſometimes generated in corrupted carcaſes: of which I have formerly given one very remarkable inſtance *, and, if it were neceſſary, many more might be produced, eſpecially in hydropic bodies, and in cancerous tumours. Nay more, we find animal putrefaction ſometimes to produce in theſe northern climates very fatal diſtempers, though they do not ariſe to the malignity of the true plague: for ſuch fevers are often bred, where a large number of people are cloſely confined together; as in gaols, ſieges, and camps.

And perhaps it may not be here amiſs to remark, that the Egyptians of old were ſo ſenſible how much the putridneſs of dead animals contributed towards breeding the plague, that they worſhipped the bird Ibis for the ſervice it did in devouring great numbers of ſerpents; which they obſerved did hurt by their ſtench when dead, as well as by their bite when alive †.

But no kind of putrefaction is ever heightened in theſe European countries to a degree capable of producing the true plague: and we learn from the obſervation of the Arabian phyſicians, that ſome indiſpoſition of the air is neceſſary in the hotteſt climates, either to cauſe ſo exalted a corruption of the forementioned ſubſtances, or at leaſt to enforce upon mens bodies the action of the effluvia exhaled from thoſe ſubſtances, while they putrefy. Both which effects may well be expected from the ſenſible ill qua-

* Eſſay on poiſons. † Cicero de nat. Deor. lib. i. § 36. ſpeaking of theſe birds, ſays: *Avertunt peſtem ab Ægypto, cum volucres angues ex vaſtitate Libyæ vento Africo invectas interficiunt atque conſumunt; ex quo fit ut illæ nec morſu vivæ noceant, nec odore mortuæ.*

lities

lities of the air before deſcribed, whenever they continue and exert their force together any conſiderable time.

What I have here advanced of the firſt original of the plague, appears to me ſo reaſonable, that I cannot enough wonder at authors for quitting the conſideration of ſuch manifeſt cauſes for hidden qualities; ſuch as malignant influences of the heavens; arſenical, bituminous, or other mineral effluvia, with the like imaginary or uncertain agents.

This however I do not ſay with deſign abſolutely to exclude all diſorders in the air, that are more latent than the intemperate heat and moiſture before mentioned, from a ſhare in increaſing and promoting the infection of the plague, where it is once bred: for I rather think this muſt ſometimes be the caſe; like to what is obſerved among us in relation to another infectious diſtemper, namely, the ſmall-pox, which is moſt commonly ſpread and propagated by the ſame manifeſt qualities of the air as thoſe here deſcribed: notwithſtanding which, this diſtemper is ſometimes known to rage with great violence in the very oppoſite conſtitution of air, *viz.* in the winter during dry and froſty weather. But to breed a diſtemper, and to give force to it when bred, are two different things. And though we ſhould allow any ſuch ſecret change in the air to aſſiſt in the firſt production of the diſeaſe; yet it may juſtly be cenſured in theſe writers, that they ſhould undertake to determine the ſpecific nature of theſe ſecret changes and alterations, which we have no means at all of diſcovering: ſince they do not ſhew themſelves in any ſuch ſenſible manner, as to come directly under our examination;

examination; nor yet do their effects, in producing the plague, point out any thing of their ſpecific nature.

All that we know is this, that the cauſe of the plague, whatever it be, is of ſuch a nature, that when taken into the body, it works ſuch changes in the blood and juices, as to produce this diſeaſe, by ſuddenly giving ſome parts of the humours ſuch corroſive qualities, that they either excite inward inflammations and gangrenes, or puſh out carbuncles and bubo's; the matter of which, when ſuppurated, communicates the like diſeaſe to others: but of the manner how this is done, I ſhall diſcourſe in the following chapter.

CHAP. II.

Of the cauſes which ſpread the plague.

I Have been thus particular in tracing the plague up to its firſt origin, in order to remove, as much as poſſible, all objections againſt what I ſhall ſay of the cauſes which excite and propagate it among us. This is done by contagion. Thoſe who are ſtrangers to the full power of this, that is, thoſe who do not underſtand how ſubtile it is, and how widely the diſtemper may be ſpread by infection, aſcribe the riſe of it wholly to the malignant quality of the air in all places, where-ever it happens; and, on the other hand, ſome have thought that the conſideration of the infectious nature of the diſeaſe muſt exclude all regard to the influence of the air: whereas the contagion accompanying the diſeaſe, and the diſpoſition

poſition of the air to promote that contagion, ought equally to be conſidered; both being neceſſary to give the diſtemper full force. The deſign therefore of this chapter is to make a proper balance between theſe two, and to ſet juſt limits to the effects of each.

For this purpoſe, I ſhall reduce the cauſes which ſpread the plague, to three; diſeaſed perſons, goods tranſported from infected places, and a corrupted ſtate of air.

There are ſeveral diſeaſes which will be communicated from the ſick to others; and this not done after the ſame manner in all. The hydrophobia is communicated no other way than by mixing the morbid juices of the diſeaſed animal immediately with the blood of the ſound, by a bite, or what is analogous thereto; the itch is given by ſimple contact; the lues venerea not without a cloſer contact; but the meaſles, ſmall-pox, and plague, are caught by a near approach only to the ſick: for in theſe three laſt diſeaſes perſons are rendered obnoxious to them only by reſiding in the ſame houſe, and converſing with the ſick.

Now, it appears by the experiments mentioned in the preface, of giving the plague to dogs by putting the bile, blood, or urine from infected perſons, into their veins, that the whole maſs of the animal fluids in this diſeaſe is highly corrupted and putrefied. It is therefore eaſy to conceive how the effluvia or fumes from liquors ſo affected may taint the ambient air. And this will more eſpecially happen, when the humours are in the greateſt fermentation, that is, at the height of the fever: as it is obſerved that fermenting liquors do at the latter end of their inteſtine motion throw off a great quantity of their moſt ſubtile

and active particles. And this discharge will be chiefly made upon those glands of the body, in which the secretions are the most copious, and the most easily increased: such are those of the mouth and skin. From these therefore the air will be impregnated with pestiferous atoms: which being taken into the body of a sound person will, in the nature of a ferment, put the fluids there into the like agitation and disorder.

The body, I suppose, receives them these two ways, by the breath, and by the skin; but chiefly by the former.

I think it certain that respiration does always communicate to the blood some parts from the air: which is proved from this observation, that the same quantity of air will not suffice long for breathing, though it be deprived of none of those qualities, by which it is fitted to inflate the lungs and agitate the blood, the uses commonly ascribed to it. And this is farther confirmed by what the learned Dr Halley has informed me, that when he was several fathom under water in his diving-engine, and breathing an air much more condensed than the natural, he observed himself to breathe more slowly than usual: which makes it more than probable, that this conveying to the blood some subtile parts from the air, is the chief use of respiration: since when a greater quantity of air than usual was taken in at a time, and consequently more of these subtile parts received at once by the blood, a less frequent respiration sufficed.

As to the skin, since there is a continual discharge made through its innumerable pores, of the matter of insensible perspiration and sweat; it is very possible that the same passages may admit subtile corpuscles, which

which may penetrate into the inward parts. Nay, it is very plain that they do ſo, from what we obſerve upon the outward application of ointments and warm bathings; which have their effects by their fineſt and moſt active parts inſinuating themſelves into the blood.

It is commonly thought, that the blood only is affected in theſe caſes by the morbific effluvia. But I am of opinion, that there is another fluid in the body, which is, eſpecially in the beginning, equally, if not more, concerned in this affair: I mean the liquid of the nerves, uſually called the animal ſpirits. As this is the immediate inſtrument of all motion and ſenſation, and has a great agency in all the glandular ſecretions, and in the circulation of the blood itſelf; any conſiderable alteration made in it muſt be attended with dangerous conſequences. It is not poſſible that the whole maſs of blood ſhould be corrupted in ſo ſhort a time as that in which the fatal ſymptoms, in ſome caſes, diſcover themſelves. Thoſe patients of the firſt claſs, mentioned in the beginning of this diſcourſe, particularly the porters who opened the infected bales of goods in the lazaretto's of Marſeilles, died upon the firſt appearance of infection, as it were by a ſudden ſtroke; being ſeized with rigours, tremblings, heart-ſickneſs, vomitings, giddineſs and heavineſs of the head, an univerſal languor and inquietude; the pulſe low and unequal: and death enſued ſometimes in a few hours.

Effects ſo ſudden muſt be owing to the action of ſome corpuſcles of great force inſinuated into, and changing the properties of, another ſubtile and active

fluid in the body; and such an one, no doubt, is the nervous liquor.

It is not to be expected that we should be able to explain the particular manner by which this is brought about. We know too little of the frame of the universe, and of the laws of attractions, repulsions, and cohesions among the minutest parcels of matter, to be able to determine all the ways by which they affect one another, especially within animal bodies, the most delicate and complicated of all the known works of nature. But we may perhaps make a probable conjecture upon the matter. Our great philosopher, whose surprising discoveries have exceeded the utmost expectations of the most penetrating minds, has demonstrated that there is diffused through the universe a subtile and elastic fluid of great force and activity. This he supposes to be the cause of the refraction and reflection of the rays of light; and that by its vibrations light communicates heat to bodies; and, moreover, that this readily pervading all bodies, produces many of their effects upon one another *.

Now, it is not improbable that the animal spirits are a thin liquor, separated in the brain, and from thence derived into the nerves, of such a nature that it admits, and has incorporated with it, a great quantity of this elastic fluid; which makes it a vital substance of great energy. And a liquor of this kind must be very susceptible of alterations from other active bodies of a different nature from it, if they approach to and are mixed with it: as we see some chemical spirits upon their being put together, fall in-

* Newton's optics, qu. 18. to 24.

to

to a fermentation, and make a compoſition of a quite different kind.

If therefore we allow the effluvia or exhalations from a corrupted maſs of humours in a body that has the plague to be volatile and fiery particles, carrying with them the qualities of thoſe fermenting juices from which they proceed; it will not be hard to conceive how theſe may, when received into the nervous fluid of a ſound perſon, excite in it ſuch inteſtine motions as may make it to partake of their own properties, and become more unfit for the purpoſes of the animal œconomy. But of this more in another place.

This is one means by which the plague, when once bred, is ſpread and increaſed: but the ſecond of the forementioned cauſes, namely, goods from infected places, extends the miſchief much wider. By the preceding cauſe, the plague may be ſpread from perſon to perſon, from houſe to houſe, or perhaps from town to town, though not to any great diſtance; but this carries it into the remoteſt regions. From hence the trading parts of Europe have their principal apprehenſions, and univerſally have recourſe to quarantines for their ſecurity. The univerſality of which practice is a ſtrong argument, that merchandiſe will communicate infection: for one cannot imagine, that ſo many countries ſhould agree in ſuch a cuſtom without the moſt weighty reaſons. But beſides, there is not wanting expreſs proof of this, from particular examples, where this injury has been done by ſeveral ſorts of goods carried from infected places to others. Some of theſe I ſhall hereafter be obliged to mention; at preſent I ſhall confine myſelf to three inſtances only. The firſt ſhall be

of

of the entrance of the plague into Rome in the year 1656, which we are aſſured was conveyed thither from Naples by cloths and other wares from that place, brought firſt to Port Neptuno, and carried from thence to the neighbouring caſtle of St Lawrence: which, after having been kept ſome time there, were conveyed into Rome *. The ſecond inſtance I ſhall take is from the account given us of the entrance of the plague into Marſeilles †; which being drawn up with great exactneſs, may be the more relied on. It appears indiſputably by this account, that the miſchief was brought thither by goods from the Levant. For the firſt who had the diſtemper, was one of the crew of the ſhip which brought theſe goods: the next were thoſe who attended upon the ſame goods, while they were under quarantine; and ſoon after the ſurgeon, whom the magiſtrates of Marſeilles appointed to examine the bodies of thoſe who died.

This relation, if duly conſidered, is, I believe, ſufficient to remove all the doubts any one can have about the power of merchandiſe to convey infection: for it affords all the evidence the moſt ſcrupulous can reaſonably deſire. Poſſibly there might be ſome fever of extraordinary malignity in Marſeilles, ſuch as is commonly called peſtilential, before the arrival of theſe goods: but no ſuch fever has any indiſputable right to the title of peſtilence, as I have before ſhewn. On the contrary, theſe two, the real peſtilence, and ſuch peſtilential fevers, muſt carefully be diſtinguiſhed, if we deſign to avoid all miſtakes in reaſoning upon theſe ſubjects.

* Gaſtaldi de peſte, p. 116. † Journal de ce qui s'eſt paſſé à Marſeilles, &c.

Some

Some ſuch fever of uncommon malignity, I ſay, might perhaps be in Marſeilles before the arrival of theſe goods. There might likewiſe perhaps be an inſtance or two of fevers attended with eruptions, bearing ſome reſemblance to thoſe of the plague: for ſuch I myſelf have ſometimes ſeen here in London. But it is not conceivable, that there ſhould be any appearance of the true plague before that time: for it was full ſix weeks from the time of the ſailor's death, which had given the alarm, and raiſed a general attention, before the magiſtrates received information of any one's dying of the plague in the city. And I believe it was never known, that the plague being once broke out, gave ſo long a truce in hot weather.

The plague which has this preſent year almoſt depopulated Meſſina, affords a third inſtance of the ſame kind. By an authentic relation of it, publiſhed here *, we are informed, that a Genoeſe veſſel from the Levant, arrived at that city; and upon notice given that a ſailor who had touched ſome caſes of cotton ſtuffs bought up at Patraſſo in the Morea, where the diſtemper then raged, was dead of the plague, in the voyage; the ſhip was put under quarantine; during which time the cotton ſtuffs were privately landed. The maſter and ſome ſailors dying three days after, the veſſel was burnt. Theſe goods lay for ſome time concealed, but were ſoon after publicly ſold: upon which the diſeaſe immediately broke out in that quarter where they were opened; and afterwards was ſpread through the whole city.

I think it not improper, for the fuller confirmation of the preſent point, to give a relation communi-

* Vid. the London gazette, July 23. 1743.

nicated

nicated to me by a perſon of unqueſtionable credit, of the like effect from goods, in reſpect to the ſmall-pox; which diſtemper is frequently carried in the nature of the plague to both the Eaſt and Weſt Indies from theſe countries, and was once carried from the Eaſt Indies to the Cape of Good Hope, in the following manner. About the year 1718, a ſhip from the Eaſt Indies arrived at that place: in the voyage three children had been ſick of the ſmall-pox: the foul linen uſed about them was put into a trunk and locked up. At the ſhip's landing, this was taken out, and given to ſome of the natives to be waſhed: upon handling the linen, they were immediately ſeized with the ſmall-pox, which ſpread into the country for many miles, and made ſuch a deſolation, that it was almoſt diſpeopled.

It has been thought ſo difficult to explain the manner how goods retain the ſeeds of contagion, that ſome authors * have imagined infection to be performed by the means of inſects; the eggs of which may be conveyed from place to place, and make the diſeaſe when they come to be hatched. But as this is a ſuppoſition grounded upon no manner of obſervation, ſo I think there is no need to have recourſe to it. If, as we have conjectured, the matter of contagion be an active ſubſtance generated chiefly from animal corruption, it is not hard to conceive how this may be lodged and preſerved in ſoft porous bodies, which are kept preſſed cloſe together.

We all know how long a time perfumes hold their ſcent, if wrapt up in proper coverings: and it is very remarkable, that the ſtrongeſt of theſe, like the

* Kircher, Langius, &c.

matter

matter we are treating of, are moſtly animal juices, as muſk, civet, &c. and that the ſubſtances found moſt fit to keep them in, are the very ſame with thoſe which are moſt apt to receive and communicate infection, as furs, feathers, ſilk, hair, wool, cotton, flax, &c. the greateſt part of which are likewiſe of the animal kind.

Nothing indeed can give us ſo juſt a notion of infection, and more clearly repreſent the manner of it, than odoriferous bodies. Some of theſe do ſtrangely revive the animal ſpirits; others inſtantaneouſly depreſs and ſink them: we may therefore conceive, that what active particles emitted from any ſuch ſubſtances do, is in the like way done by peſtiferous bodies; ſo that contagion is no more than the effect of volatile offenſive matter drawn into the body by our ſmelling.

The third cauſe we aſſigned for the ſpreading of contagion, was a corrupted ſtate of air. Although the air be in a right ſtate, yet a ſick perſon may infect thoſe who are very near him; as we find the peſtilence to continue ſometimes among the crew of a ſhip, after they have ſailed out of the infectious air wherein the diſeaſe was firſt caught. A remarkable accident of this nature is recorded to have happened in the plague at Genoa in the year 1656. Eleven perſons put to ſea in a felucca, with deſign to withdraw themſelves from the contagion, and retire into Provence; but one of them falling ſick of the plague ſoon after they had imbarked, infected the reſt; inſomuch that others being taken ill, and dying in their turns, they were not admitted any where, but were forced to return from whence they came: and by

that time the boat arrived again at Genoa, no more than one of them ſurvived *.

However, in this caſe the malady does not uſually ſpread far, the contagious particles being ſoon diſperſed and loſt. But when in a corrupt diſpoſition of the air the contagious particles meet with the ſubtile parts generated by that corruption, by uniting with them they become much more active and powerful, and likewiſe of a more durable nature; ſo as to form an infectious matter capable of conveying the miſchief to a greater diſtance from the diſeaſed body, out of which it was produced.

In general, a hot air is more diſpoſed to ſpread contagion than a cold one, as no one can doubt, who conſiders how much all kinds of effluvia are farther diffuſed in a warm air, than in the contrary. But moreover, that ſtate of air, when unſeaſonable moiſture and want of winds are added to its heat, which gives birth to the plague in ſome countries, will doubtleſs promote it in all. For Hippocrates ſets down the ſame deſcription of a peſtilential ſtate of air in his country, as the Arabians do of the conſtitution which gives riſe to the plague in Africa †. Mercurialis aſſures us the ſame conſtitution of air attended the peſtilence in his time at Padua ‡: and Gaſſendus obſerved the ſame in the plague of Digne ||.

* Toulon, traité de la peſte. † Hippocr. epid. l. iii. That Hippocrates deſcribes here the conſtitution of air accompanying the true plague, contrary to what ſome have thought, Galen teſtifies in his comment upon this place, in libr. de temper. l. i. c. 4. and in lib. de differentiis febr. lib. i. c. 4.

‡ Vid. Mercurial. prælect. de peſtilent.

|| Notitia eccleſ. Dinienſis.

Beſides,

Beſides, it is eaſy to ſhew how the air, by the ſenſible ill qualities diſcourſed of in the laſt chapter, ſhould favour infectious diſeaſes, by rendering the body obnoxious to them.

Indeed other hurtful qualities of the air are more to be regarded than its heat alone: for the plague is ſometimes ſtopt, while the heat of the ſeaſon increaſes, upon the emendation of the air in other reſpects. At Smyrna the plague, which is yearly carried thither by ſhips, conſtantly ceaſes about the 24th of June, by the dry and clear weather they always have at that time; the unwholeſome damps being then diſſipated that annoy the country in the ſpring. However, the heat of the air is of ſo much conſequence, that if any ſhip brings it in the winter-months of November, December, January, or February, it never ſpreads; but if later in the year, as in April or afterwards, it continues till the time before mentioned.

But moreover, what was ſaid before of ſome latent diſorders in the air having a ſhare in ſpreading the plague, will likewiſe have place in theſe countries; as the laſt plague in the city of London remarkably proves, the ſeeds of which, upon its firſt entrance, and while it was confined to a houſe or two, preſerved themſelves through a hard froſty winter, and again put forth their malignant quality as ſoon as the warmth of the ſpring gave them force: but, at the latter end of the next winter, they were ſuppreſſed ſo as to appear no more, though in the month of December more than half the pariſhes of the city were infected.

A corrupted ſtate of air is, without doubt, neceſſary to give theſe contagious atoms their full force;

for otherwiſe, it were not eaſy to conceive how the plague, when once it had ſeized any place, ſhould ever ceaſe but with the deſtruction of all the inhabitants: which is readily accounted for by ſuppoſing an emendation of the qualities of the air, and the reſtoring of it to a healthful ſtate capable of diſſipating and ſuppreſſing the malignity.

On the other hand, it does not appear, that the air, however corrupted, is uſually capable of carrying infection to a very great diſtance; but that commonly the plague is ſpread from town to town by infected perſons and goods: for there are numberleſs inſtances where the plague has cauſed a great mortality in towns, while other towns and villages, very near them, have been entirely free. And hence it is, that the plague ſometimes ſpreads from place to place very irregularly. Thuanus * ſpeaks of a plague in Italy, which one year was at Trent and Verona, the next got into Venice and Padua, leaving Vicenza, an intermediate place, untouched, though the next year that alſo felt the ſame ſtroke: a certain proof that the plague was not carried by the air from Verona to Padua and Venice; for the infected air muſt have tainted all in its paſſage. We have had lately in France one inſtance of the ſame nature, when the plague was carried at once out of Provence ſeveral leagues into the Gevaudan. Uſually indeed the plague, eſpecially when more violent than ordinary, ſpreads from infected places into thoſe which border upon them: which probably is ſometimes effected by ſome little communication infected towns are obliged to hold with the country about them for the ſake of ne-

* Hiſtor. lib. lxii.

ceſſaries,

ceſſaries, the ſubtilty of the venom now and then eluding the greateſt precautions; and at other times by ſuch as withdraw themſelves from infected places into the neighbourhood.

I own it cannot be demonſtrated, that when the plague makes great ravage in any town, the number of ſick ſhall never be great enough to load the air with infectious effluvia, emitted from them in ſuch plenty, that they may be conveyed by the winds into a neighbouring town or village, without being diſperſed ſo much as to hinder their producing any ill effects; eſpecially ſince it is not unuſual for the air to be ſo far charged with theſe noxious atoms, as to leave no place within the infected town ſecure: inſomuch that when the diſtemper is at its height, all ſhall be indifferently infected, as well thoſe who keep from the ſick, as thoſe who are near them; though, at the beginning of a plague, to avoid all communication with the diſeaſed, is an effectual defence. However, I do not think this is often the caſe: juſt as the ſmoke with which the air of the city of *London* is conſtantly impregnated, eſpecially in winter, is not carried many miles diſtant; though the quantity of it is vaſtly greater than the quantity of infectious effluvia, that the moſt mortal plague could generate.

But, to conclude what relates to the air, ſince the ill qualities of it in theſe northern countries are not alone ſufficient to excite the plague, without imported contagion, this ſhews the errour of a common opinion, countenanced by authors of great name *, that we are neceſſarily viſited with the plague once in thirty or forty years: which is a mere fancy, without

* Sydenham de peſte.

foundation

foundation either in reaſon or experience; and therefore people ought to be delivered from ſuch vain fears. Since the peſtilence is never originally bred with us, but always brought accidentally from abroad, its coming can have no relation to any certain period of time. And although our three or four laſt plagues have fallen out nearly at ſuch intervals, yet that is much too ſhort a compaſs of years to be a foundation for a general rule. Accordingly we ſee that almoſt fourſcore years have paſſed over without any calamity of this kind.

The air of our climate is ſo far from being ever the original of the true plague, that moſt probably it never produces thoſe milder infectious diſtempers, the ſmall-pox and meaſles. For theſe diſeaſes were not heard of in Europe before the Moors had entered Spain: and (as I have obſerved in the preface) they were afterwards propagated and ſpread through all nations, chiefly by means of the wars with the Saracens.

Moreover, we are ſo far from any neceſſity of theſe periodical returns of the plague, that, on the contrary, though we have had ſeveral ſtrokes of this kind, yet there are inſtances of bad contagions from abroad being brought over to us, which have proved leſs malignant here, when our northern air has not been diſpoſed to receive ſuch impreſſions.

The ſweating ſickneſs, before hinted at, called *Sudor Anglicus* and *Febris Ephemera Britannica*, becauſe it was commonly thought to have taken its riſe here, was moſt probably of a foreign original: and though not the common plague with glandular tumours, and carbuncles, yet a real peſtilence from the

ſame

ſame cauſe, only altered in its appearance, and abated in its violence, by the ſalutary influence of our climate. For it preſerved an agreement with the common plague in many of its ſymptoms, as exceſſive faintneſs and inquietudes, inward burnings, &c. theſe ſymptoms being no where obſerved in ſo intenſe a degree as here they are deſcribed to have been, except in the true plague: and, what is much more, it was likewiſe a contagious diſeaſe.

The firſt time this was felt here, which was in the year 1485, it began in the army with which King Henry VII. came from France and landed in Wales *: and it has been ſuppoſed by ſome to have been brought from the famous ſiege of Rhodes by the Turks three or four years before, as may be collected from what Dr Keyes ſays in one place of his treatiſe on this diſeaſe †. Beſides, of the ſeveral returns which this has made ſince that time, viz. in the years 1506, 1517, 1528, and 1551, that in the year 1528 may very juſtly be ſuſpected to have been owing to the common peſtilence, which at thoſe times raged in Italy ‡, as I find one of our hiſtorians has long ago conjectured ‖: and the others were very probably from a Turkiſh infection. If at leaſt ſome of theſe returns were not owing to the remains of former attacks, a ſuitable conſtitution of air returning to put the latent ſeeds in action before they were quite deſtroyed. It is the more probable that this

* Vid. Caium de febr. ephemer. Britan. and Lord Bacon's hiſtory of Henry VII. † Pag. 162. edit. Lovan. ‡ Vid. Rondinelli contagio in Firenze, & Summonte hiſtor. di Napoli. ‖ Lord Herbert's hiſtory of Henry VIII.

diſeaſe

diſeaſe was owing to imported contagion; becauſe we are aſſured, that this form of the ſickneſs was not peculiar to our iſland, but that it made great deſtruction with the ſame ſymptoms in Germany, and other countries *.

I call this diſtemper a plague with leſſened force: becauſe though its carrying off thouſands for want of right management was a proof of its malignity, which indeed in one reſpect exceeded that of the common plague itſelf, (for few, who were deſtroyed with it, ſurvived the ſeizure above one natural day), yet its going off ſafely with profuſe ſweats in twenty-four hours, when due care was taken to promote that evacuation, ſhewed it to be what a learned and wiſe hiſtorian calls it, rather a ſurpriſe to nature, than obſtinate to remedies; who aſſigns this reaſon for expreſſing himſelf thus, that if the patient was kept warm with temperate cordials, he commonly recovered †. And, what I think yet more remarkable, ſweating, which was the natural criſis of this diſtemper, has been found by great phyſicians the beſt remedy againſt the common plague: by which means, when timely uſed, that diſtemper may ſometimes be carried off without any external tumours. Nay beſides, a judicious obſerver informs us, that in many of his patients, when he had broken the violence of the diſtemper by ſuch an artificial ſweat, a natural ſweat not excited by medicines would break forth exceedingly refreſhing ‡.

And I cannot but take notice, as a confirmation of what I have been advancing, that we had here the ſame kind of fever in the year 1713, about the

* Thuani hiſtor. lib. v. † Lord Verulam's hiſtory of Henry VII. ‡ Vid. Sydenham de peſte, ann. 1665.

month

month of September, which was called the *Dunkirk fever*, as being brought by our ſoldiers from that place. This probably had its original from the plague, which a few years before broke out at Dantzic, and continued ſome time among the cities of the north. With us this fever began only with a pain in the head, and went off in large ſweats uſually after a day's confinement: but at Dunkirk it was attended with the additional ſymptoms of vomiting, diarrhœa, &c.

To return from this digreſſion: From all that has been ſaid, it appears, I think, very plainly, that the plague is a real poiſon, which being bred in the ſouthern parts of the world, is carried by commerce into other countries, particularly into Turky, where it maintains itſelf by a kind of circulation from perſons to goods: which is chiefly owing to the negligence of the people there, who are ſtupidly careleſs in this affair. That when the conſtitution of the air happens to favour infection, it rages there with great violence: that at that time more eſpecially diſeaſed perſons give it to one another, and from them contagious matter is lodged in goods of a looſe and ſoft texture, which being packed up and carried into other countries, let out, when opened, the impriſoned ſeeds of contagion, and produce the diſeaſe whenever the air is diſpoſed to give them force; otherwiſe they may be diſſipated without any conſiderable ill effects. And laſtly, that the air does not uſually diffuſe and ſpread theſe to any great diſtance, if intercourſe and commerce with the place infected be ſtrictly prevented.

PART II.

Of the METHODS to be taken againſt the PLAGUE.

CHAP. I.

Of preventing infection from other countries.

AS it is a ſatisfaction to know, that the plague is not a native of our country, ſo this is likewiſe an encouragement to the utmoſt diligence in finding out means to keep ourſelves clear from it.

This caution conſiſts of two parts: The preventing its being brought into our iſland; and, if ſuch a calamity ſhould happen, the putting a ſtop to its ſpreading among us.

The firſt of theſe is provided for by the eſtabliſhed method of obliging ſhips that come from infected places, to perform quarantine: as to which, I think it neceſſary, that the following rules be obſerved.

Near to our ſeveral ports, there ſhould be lazarettoes built in convenient places, on little iſlands, if it can ſo be, for the reception both of men and goods, which arrive from places ſuſpected of infection: the keeping men in quarantine on board the ſhip being not ſufficient; the only uſe of which is to obſerve whether any die among them. For infection may be preſerved ſo long in cloaths, in which it is once lodged, that as much, nay more of it, if ſickneſs continues in the ſhip, may be brought on ſhore at the end than at the beginning of forty days: unleſs a new quarantine be begun every time any perſon dies; which

which might not end but with the deſtruction of the whole ſhip's crew.

If there has been any contagious diſtemper in the ſhip; the ſound men ſhould leave their cloaths, which ſhould be ſunk in the ſea, the men waſhed and ſhaved, and having freſh cloaths, ſhould ſtay in the lazaretto thirty or forty days. The reaſon of this is, becauſe perſons may be recovered from a diſeaſe themſelves, and yet retain matter of infection about them a conſiderable time; as we frequently ſee the ſmall-pox taken from thoſe who have ſeveral days before paſſed through the diſtemper.

The ſick, if there be any, ſhould be kept in houſes remote from the ſound, and, ſome time after they are well, ſhould alſo be waſhed and ſhaved, and have freſh cloaths; whatever they wore while ſick being ſunk or buried: and then being removed to the houſes of the ſound, ſhould continue there thirty or forty days.

I am particularly careful to deſtroy the cloaths of the ſick, becauſe they harbour the very quinteſſence of contagion. A very ingenious author *, in his admirable deſcription of the plague at Florence in the year 1348, relates what himſelf ſaw: That two hogs finding in the ſtreets the rags which had been thrown out from off a poor man dead of the diſeaſe, after ſnuffling upon them, and tearing them with their teeth, they fell into convulſions, and died in leſs than an hour. The learned Fracaſtorius acquaints us, that in his time, there being a plague in Verona, no leſs than twenty-five perſons were ſucceſſively killed

* Boccaccio Decameron. giornat. prim.

by the infection of one fur garment *. And Foreſtus gives a like inſtance of ſeven children, who died by playing upon cloaths brought to Alckmaer in North Holland, from an infected houſe in Zealand †. The late Mr Williams, chaplain to Sir Robert Sutton, when ambaſſadour at Conſtantinople, uſed to relate a ſtory of the ſame nature told him by a baſſa: That in an expedition this baſſa made to the frontiers of Poland, one of the janiſaries under his command died of the plague; whoſe jacket, a very rich one, being bought by another janiſary, it was no ſooner put on, but he alſo was taken ſick, and died: and the ſame misfortune befel five janiſaries more, who afterwards wore it. This the baſſa related to Mr Williams, chiefly for the ſake of this farther circumſtance, that the incidents now mentioned prevailed upon him to order the burning of the garment: deſigning by this inſtance to let Mr Williams ſee there were Turks who allowed themſelves in ſo much freedom of thought, as not to pay that ſtrict regard to the Mahometan doctrine of fatality, as the vulgar among them do.

If there has been no ſickneſs in the ſhip, I ſee no reaſon why the men ſhould perform quarantine. Inſtead of this, they may be waſhed, and their cloaths aired in the lazaretto, as goods, for one week.

But the greateſt danger is from ſuch goods as are apt to retain infection, ſuch as cotton, hemp, and flax, paper or books, ſilk of all ſorts, linen, wool, feathers, hair, and all kinds of ſkins. The lazaretto for theſe ſhould be at a diſtance from that for the

* De contagione, l. iii. c. 7. † Obſervat. l. vi. ſchol. ad obſerv. 22.

men;

men; and they muſt in convenient warehouſes be unpacked, and expoſed, as much as may be, to the freſh air for forty days.

This may perhaps ſeem too long; but as we do not know how much time preciſely is neceſſary to purge the interſtices of ſpongy ſubſtances from infectious matter by freſh air, the caution cannot be too great in this point. Certainly the time here propoſed, having been long eſtabliſhed by general cuſtom, ought not in the leaſt to be retrenched; unleſs there could be a way found out of trying when bodies have ceaſed to emit the noxious fumes. Poſſibly this might be diſcovered by putting tender animals near to them, particularly little birds: becauſe it has been obſerved, in times of the plague, that the country has been forſaken by the birds; and thoſe kept in houſes have many of them died *. Now, if it ſhould be found, that birds let looſe among goods at the beginning of their quarantine, are obnoxious to the contagion in them, it may be known, in good meaſure, when ſuch goods are become clean, by repeating the trial till birds let fly among them receive no hurt. But the uſe of this expedient can be known only by experience. In the mean time, I own I am fond of the thought, in compaſſion to poor labourers, who muſt expoſe their lives to danger, in the attendance upon this work: and though I am well aware that there are plagues among animals, which do not indifferently affect all kinds of them, ſome being confined to a particular ſpecies, (like the diſeaſe of the black cattle here, a few years ſince, which neither proved infectious to other brutes, nor to men); yet it has al-

* Diemerbroeck de peſte, l. i. c. 4.

ways

ways been obſerved that the true plague among men has been deſtructive to all creatures of what kind ſoever.

A very remarkable ſtory, lately communicated to me by a perſon of undoubted credit, is too much to the purpoſe to be here omitted. The fact is this. In the year 1726, an Engliſh ſhip took in goods at Grand Cairo, in the time of the plague's raging there, and carried them to Alexandria. Upon opening one of the bales of wool in a field, two Turks employed in the work were immediately killed; and ſome birds, which happened to fly over the place, dropped down dead.

However, the uſe of quarantines is not wholly fruſtrated by our ignorance of the exact time required for this purification: ſince the quarantine does at leaſt ſerve as a trial whether goods are infected or not; it being hardly poſſible that every one of thoſe who are obliged to attend upon them, can eſcape hurt if they are ſo. And, whenever that happens, the goods muſt be deſtroyed.

I take it for granted, that the goods ſhould be opened, when they are put into the lazaretto, otherwiſe their being there will avail nothing. This is the conſtant practice in the ports of Italy. That it is ſo at Leghorn, appears by the acount lately publiſhed of the manner in which quarantines are there performed: and I find, that the ſame rule is obſerved at Venice, from an authentic paper I have before me, containing the methods made uſe of in that city, where quarantines have been injoined ever ſince the year 1484; at which time, as far as I can learn, they were firſt inſtitituted in Europe. In that place all bales

bales of cotton, of camel's or of beaver's hair, and the like, are ript open from end to end, and holes made in them by the porters every day, into which they thruſt their naked arms, in order that the air may have free acceſs to every part of the goods. That ſome ſuch cautions as theſe ought not to be omitted, is clearly proved by the misfortune which happened in the iſland of Bermudas about the year 1695; where, as the account was given me by the learned Dr Halley, a ſack of cotton put on ſhore by ſtealth, lay above a month without any prejudice to the people of the houſe where it was hid: but when it came to be diſtributed among the inhabitants, it carried ſuch a contagion along with it, that the living ſcarce ſufficed to bury the dead. This relation Dr Halley received from Captain Tucker of Bermudas, brother to Mr Tucker, late under-ſecretary in our ſecretary's office.

Indeed, as it has been frequently experienced, that of all the goods which harbour infection, cotton in particular is the moſt dangerous, and Turky is almoſt a perpetual ſeminary of the plague; I cannot but think it highly reaſonable, that whatever cotton is imported from that part of the world, ſhould at all times be kept in quarantine; becauſe it may have imbibed infection at the time of its packing up, notwithſtanding no miſchief has been felt from it by the ſhip's company. And the length of time from its being packed up to its arrival here, is no certain ſecurity that it is cleared from the infection. At leaſt, it is found, that the time employed by ſhips in paſſing between Turky and Marſeilles, is not long enough for goods to loſe their infection: as appears not

not only from the late inſtance, but alſo from an obſervation made in a certain memorial drawn up by the deputy of trade at Marſeilles *. Marſeilles is the only port in France allowed to receive goods from the Levant, on account of its ſingular convenience for quarantines, by reaſon of ſeveral ſmall iſlands ſituate about it. The ports of France in the weſtern ocean having had a deſire to be allowed the ſame liberty, their deputies preſented, in the year 1701, a memorial to the royal council of trade, containing ſeveral reaſons for their pretenſions. To this the deputy at Marſeilles makes reply in the memorial I am ſpeaking of, in which this advantage of Marſeilles for quarantines above the other ports, is much inſiſted upon: and, to evince the importance thereof, it is declared in expreſs words, that many times perſons have been found in that place to die of the plague in their attendance upon goods under quarantine, Now, if it be certain, that goods have retained infection during their paſſage from Turky to Marſeilles; it is too hardy a preſumption to be admitted in an affair ſo important as this, that they muſt neceſſarily loſe all contagion in the time of their coming to us, becauſe the voyage is ſomething longer. But beſides this, there are ſome few inſtances of goods, that have retained their infection many years. In particular, Alex. Benedictus gives a very diſtinct relation of a feather-bed, that was laid by ſeven years on ſuſpicion of its being infected, which produced miſchievous effects at the end of that great length of time †. And Sir Theodore Mayerne relates, that

* Memorials preſented by the deputies of the council of trade, in France, to the royal council, pag. 44. and 45.

† Alex. Benedict. de peſte, cap. 3.

ſome

ſome cloaths fouled with blood and matter from plague-ſores being lodged between matting and the wall of a houſe in Paris, gave the plague ſeveral years after to a workman, who took them out, which preſently ſpread through the city *.

What makes cotton ſo eminently dangerous, is its great aptitude to imbibe and retain any ſort of effluvia near it; of which I have formerly made a particular experiment, by cauſing ſome cotton to be placed for one day near a piece of putrefying fleſh from an amputated limb, in a bell-glaſs, but without touching it; for the cotton imbibed ſo ſtrong a taint, that being put up in a cloſe box, it retained its offenſive ſcent above ten months, and would, I believe, have kept it for years. If, inſtead of the fumes of putrefied fleſh from a ſound body, this cotton had been thus impregnated with the fumes of corrupted matter from one ſick of the plague; I make no doubt but it would have communicated infection. And the experiment would have ſucceeded alike in both caſes, if inſtead of cotton, ſilk, wool, or hair had been incloſed in the veſſel; animal ſubſtances being the moſt apt to attract the volatile particles, which come from bodies of the ſame nature with themſelves.

As all reaſonable proviſions ſhould be made both for the ſound and ſick, who perform quarantine; ſo the ſtrict keeping of it ought to be enforced by the ſevereſt penalties. And if a ſhip comes from any place, where the plague raged, at the time of the ſhip's departure from it, with more than uſual vio-

* In a paper of advice againſt the Plague, laid before the king and council by Sir Theod. Mayerne, in the year 1631. MS.

lence; it will be the ſecureſt method to ſink all the goods, and even the ſhip ſometimes; eſpecially if any on board have died of the diſeaſe.

Nor ought this further caution to be omitted, that when the contagion has ceaſed in any place by the approach of winter, it will not be ſafe to open a free trade with it too ſoon; becauſe there are inſtances of the diſtemper's being ſtopt by the winter-cold, and yet the ſeeds of it not deſtroyed, but only kept unactive, till the warmth of the following ſpring has given them new life and force. Thus in the great plague at Genoa about fourſcore years ago, which continued part of two years, the firſt ſummer about ten thouſand died, the winter following hardly any; but the ſummer after no leſs than ſixty thouſand. Likewiſe the laſt plague at London appeared the latter end of the year 1664, and was ſtopt during the winter by a hard froſt of near three months continuance; ſo that there remained no farther appearance of it till the enſuing ſpring *. Now, if goods brought from ſuch a place ſhould retain any of the latent contagion, there will be danger of their producing the ſame miſchief in the place to which they are brought as they would have cauſed in that from whence they came.

But, above all, it is neceſſary, that the clandeſtine importing of goods be puniſhed with the utmoſt rigour; from which wicked practice I ſhould always apprehend more danger of bringing the diſeaſe, than by any other way whatſoever.

Theſe are, I think, the moſt material points, to which regard is to be had in defending ourſelves a-

* Hodges de peſte.

gainſt

gainſt contagion from other countries. The particular manner of putting theſe directions in execution, as the viſiting of ſhips, regulation of lazarettoes, &c. I leave to proper officers, who ought ſometimes to be aſſiſted herein by able phyſicians.

CHAP. II.

Of ſtopping the progreſs of the plague, if it ſhould enter our country.

THE next conſideration is, what to do in caſe, through a miſcarriage in the public care, by the neglect of officers, or otherwiſe, ſuch a calamity ſhould be ſuffered to befall us.

There is no evil in the world, in which the great rule of reſiſting the beginning, more properly takes place, than in the preſent caſe; and yet it has unfortunately happened, that the common ſteps formerly taken have had a direct tendency to hinder the putting this maxim in practice.

As the plague always breaks out in ſome particular place, it is certain, that the directions of the civil magiſtrate ought to be ſuch, as to make it as much for the intereſt of infected families to diſcover their misfortune, as it is, when a houſe is on fire, to call in the aſſiſtance of the neighbourhood: whereas, on the contrary, the methods taken by the public, on ſuch occaſions, have always had the appearance of a ſevere diſcipline, and even puniſhment, rather than of a compaſſionate care; which muſt naturally make the infected conceal the diſeaſe as long as was poſſible.

The main import of the orders iſſued out at theſe

times was *; as ſoon as it was found, that any houſe was infected, to keep it ſhut up, with a large red croſs, and theſe words, *Lord, have mercy upon us*, painted on the door; watchmen attending day and night to prevent any one's going in or out, except ſuch phyſicians, ſurgeons, apothecaries, nurſes, ſearchers, &c. as were allowed by authority; and this to continue at leaſt a month after all the family was dead or recovered.

It is not eaſy to conceive a more diſmal ſcene of miſery than this: families locked up from all their acquaintance, though ſeized with a diſtemper which the moſt of any in the world requires comfort and aſſiſtance; abandoned it may be to the treatment of an inhumane nurſe, (for ſuch are often found at theſe times about the ſick); and ſtrangers to every thing but the melancholy ſight of the progreſs death makes among themſelves: with ſmall hopes of life left to the ſurvivors, and thoſe mixed with anxiety and doubt, whether it be not better to die, than to prolong a miſerable being, after the loſs of their beſt friends and neareſt relations.

If fear, deſpair, and all dejection of ſpirits, diſpoſe the body to receive contagion, and give it a great power, where it is received, as all phyſicians agree they do; I do not ſee how a diſeaſe can be more enforced than by ſuch a treatment.

Nothing can juſtify ſuch cruelty, but the plea, that it is for the good of the whole community, and prevents the ſpreading of infection. But this upon due

* Vid. Directions for the cure of the plague, by the college of phyſicians; and orders by the lord mayor and aldermen of London, publiſhed 1665.

conſideration

conſideration will be found quite otherwiſe: for while contagion is kept nurſed up in a houſe, and continually increaſed by the daily conqueſts it makes, it is impoſſible but the air ſhould become tainted in ſo eminent a degree, as to ſpread the infection into the neighbourhood upon the firſt outlet. The ſhutting up houſes in this manner is only keeping ſo many ſeminaries of contagion, ſooner or later to be diſperſed abroad: for the waiting a month, or longer, from the death of the laſt patient, will avail no more than keeping a bale of infected goods unpacked; the poiſon will fly out, whenever the Pandora's box is opened.

As theſe meaſures were owing to the ignorance of the true nature of contagion, ſo they did, I firmly believe, contribute very much to the long continuance of the plague, every time they have been practiſed in this city; and, no doubt, they have had as ill effects in other countries.

It is therefore no wonder, that grievous complaints were often made againſt this unreaſonable uſage; and that the citizens were all along under the greateſt apprehenſions of being thus ſhut up. This occaſioned their concealing the diſeaſe as long as they could, which contributed very much to the enforcing and ſpreading of it: and when they were confined, it often happened that they broke out of their impriſonment, either by getting out at windows, &c. or by bribing the watchmen at their doors; and ſometimes even by murdering them. Hence in the nights, people were often met running about the ſtreets, with hideous ſhrieks of horror and deſpair, quite diſtracted either from the violence of the fever, or from the

terrors

terrors of mind, into which they were thrown by the daily deaths they ſaw of their neareſt relations.

In theſe miſerable circumſtances, many ran away; and when they had eſcaped, either went to their friends in the country, or built huts or tents for themſelves in the open fields, or got on board ſhips lying in the river. A few alſo were ſaved by keeping their houſes cloſe from all communication with their neighbours *.

And it muſt be obſerved, that whenever popular clamours prevailed ſo far, as to procure ſome releaſe for the ſick, this was remarkably followed with an abatement of the diſeaſe. The plague, in the year 1636, began with great violence; but leave being given by the king's authority for people to quit their houſes, it was obſerved, that not one in twenty of the well perſons removed fell ſick, nor one in ten of the ſick died †. Which ſingle inſtance alone, had there been no other, ſhould have been of weight ever after to have determined the magiſtracy againſt too ſtrict confinements. But beſides this, a preceding plague, viz. in the year 1625, affords us another inſtance of a very remarkable decreaſe upon the diſcontinuing to ſhut up houſes. It was indeed ſo late in the year before this was done, that the near approach of winter was doubtleſs one reaſon for the diminution of the diſeaſe which followed: yet this was ſo very great, that it is at leaſt paſt diſpute, that the liberty then permitted was no impediment to it. For this opening of the houſes was allowed of in the beginning of September: and whereas the laſt week in Auguſt, there died no leſs

* Vid. A journal of the plague in 1665. by a citizen. London, 1722. † Diſcourſe upon the air, by Tho. Cock.

than

than four thouſand two hundred and eighteen, the very next week the burials were diminiſhed to three thouſand three hundred and forty-four; and in no longer time than to the fourth week after, to eight hundred and fifty-two *.

Since therefore the management in former times neither anſwers the purpoſe of diſcovering the beginning of the infection, nor of putting a ſtop to it when diſcovered, other meaſures are certainly to be taken; which, I think, ſhould be of this nature.

There ought, in the firſt place, a council of health to be eſtabliſhed, conſiſting of ſome of the principal officers of ſtate, both eccleſiaſtical and civil, ſome of the chief magiſtrates of the city, two or three phyſicians, &c. And this council ſhould be intruſted with ſuch powers, as might enable them to ſee all their orders executed with impartial juſtice, and that no unneceſſary hardſhips, under any pretence whatever, be put upon any by the officers they employ.

Inſtead of ignorant old women, who are generally appointed ſearchers in pariſhes to inquire what diſeaſes people die of, that office ſhould be committed to underſtanding and diligent men: whoſe buſineſs it ſhould be, as ſoon as they find any have died after an uncommon manner, particularly with livid ſpots, bubo's, or carbuncles, to give notice thereof to the council of health; who ſhould immediately ſend ſkilful phyſicians to examine the ſuſpected bodies, and to viſit the houſes in the neighbourhood, eſpecially of the poorer ſort, among whom this evil generally begins. And if upon their report it appears, that a peſtilential

* Vid. The ſhutting up houſes ſoberly debated, anno 1665.

diſtemper

diſtemper is broken out, they ſhould without delay order all the families in which the ſickneſs is, to be removed; the ſick to different places from the ſound: but the houſes for both ſhould be three or four miles out of town; and the ſound people ſhould be ſtript of all their cloaths, and waſhed and ſhaved, before they go into their new lodgings. Theſe removals ought to be made in the night, when the ſtreets are clear of people: which will prevent all danger of ſpreading the infection. And beſides, all poſſible care ſhould be taken to provide ſuch means of conveyance for the ſick, that they may receive no injury.

As this management is neceſſary with reſpect to the poor and meaner ſort of people; ſo the rich, who have conveniencies, may, inſtead of being carried to lazarettoes, be obliged to go to their country-houſes; provided that care be always taken to keep the ſound ſeparated from the infected. And at the ſame time all the inhabitants who are yet well, ſhould be permitted, nay encouraged to leave the town, which the thinner it is, will be the more healthy.

No manner of compaſſion and care ſhould be wanting to the diſeaſed; to whom, when lodged in clean and airy habitations, there would, with due cautions, be no great danger in giving attendance. All expenſes ſhould be paid by the public, and no charges ought to be thought great, which are counterbalanced with the ſaving a nation from the greateſt of calamities. Nor does it ſeem to me at all unreaſonable, that a reward ſhould be given to the perſon that makes the firſt diſcovery of infection in any place; ſince it is undeniable, that the making known the evil to thoſe who are provided with proper methods

thods againſt it, is the firſt and main ſtep towards the overcoming it.

Although the methods taken in other countries, as well as in our own, have generally been different from what we have here recommended; yet there are not wanting ſome inſtances of extraordinary ſucceſs attending theſe meaſures, whenever they have happened to be put in practice.

The magiſtrates of the city of Ferrara in Italy, in the year 1630, when all the country round about them was infected with the plague, obſerving the ill ſucceſs of the conduct of their neighbours, who, for fear of loſing their commerce, did all they could to conceal the diſeaſe, by keeping the ſick in their houſes, reſolved, whenever occaſion ſhould require, to take a different method. Accordingly, as ſoon as they received information, that one had died in their city of the peſtilence, they immediately removed the whole family he belonged to into a lazaretto, where all, being ſeven in number, likewiſe died. But though the diſeaſe was thus malignant, it went no farther, being ſuppreſſed at once by this method. Within the ſpace of a year the ſame caſe returned ſeven or eight times, and this management as often put a ſtop to it. The example of this city was afterwards followed more than once by ſome other towns in the ſame territory, with ſo good ſucceſs, that it was thought expedient, for the common good, to publiſh, in the memoirs of the people of Ferrara, this declaration: That the only remedy againſt the plague is to make the moſt early diſcovery of it, that is poſſible, and thus to extinguiſh it in the very beginning *.

* Muratori governo della peſte, lib. i. c. 5.

No leſs remarkable than this occurrence at Ferrara, is what happened at Rome in the plague I have taken notice of before, in the year 1657. When the diſeaſe had ſpread itſelf among both rich and poor, and raged in the moſt violent manner; the Pope appointed Cardinal Gaſtaldi, to be commiſſary-general of health, giving him for a time the power of the whole ſacred college, with full commiſſion to do whatever he ſhould judge neceſſary. Hereupon he gave ſtrict orders, that no ſick or ſuſpected perſons ſhould ſtay in their own houſes. The ſick he removed, upon the firſt notice, to a lazaretto in the iſland of the Tiber; and all who were in the ſame houſes with them to other hoſpitals juſt without the city, in order to be ſent to the iſland, if they ſhould fall ſick. At the ſame time he took diligent care to ſend away their goods to an airy place to be cleanſed. He executed theſe regulations with ſo much ſtrictneſs, that no perſons of the higheſt quality were exempted from this treatment; which occaſioned at firſt great complaints againſt the Cardinal for his ſeverity; but ſoon after he had general thanks: for in two months time, by this means, he entirely cleared the city of the peſtilence, which had continued in it almoſt two years. And it was particularly obſerved, that whereas before, when once the diſeaſe had got into a houſe, it ſeldom ended without ſeizing the whole family; in this management ſcarce five out of an hundred of the ſound perſons removed were infected *.

I cannot but take notice, that the plague was ſtopped at Marſeilles a full fortnight by the ſame meaſures, and probably might have been wholly extinguiſhed,

* Cardin. Gaſtaldi de avertenda peſte, c. 10.

had

had not new force been given it by the unſeaſonable confidence of the inhabitants upon this intermiſſion: which, we are informed, was ſo great, that they would not believe the peſtilence had been at all among them, and publicly upbraided the phyſicians and ſurgeons for frighting them cauſelefsly *. At this time, no doubt, they muſt have neglected the cautions neceſſary for their ſecurity ſo much, as to leave us no room to be ſurpriſed, that the diſeaſe ſhould after this break out again with too great violence to be a ſecond time overcome.

But, beſides theſe examples in foreign countries, we have one inſtance of the ſame nature nearer home. When the plague was laſt here in England, upon its firſt entrance into Poole in Dorſetſhire, the magiſtrates immediately ſuppreſſed it, by removing the ſick into peſt-houſes, without the town, as is well remembered there to this time. A very remarkable occurrence has greatly contributed towards preſerving all the circumſtances of this tranſaction in memory. They found ſome difficulty in procuring any one to attend upon the ſick after their removal: which obliged the town to engage a young woman, then under ſentence of death, in that ſervice, on a promiſe to uſe their intereſt for obtaining her pardon. The young woman eſcaped the diſeaſe, but neglecting to ſolicit the corporation for the accompliſhment of their engagement with her, three or four months after ſhe was barbarouſly hanged by the mayor upon a quarrel between them.

I would have it here obſerved, that as the advice

* Journal de ce qui s'eſt paſſé à Marſeilles, &c. p. 9. 10. 11.

I have been giving is founded upon this principle, that the beſt method for ſtopping infection, is to ſeparate the healthy from the diſeaſed; ſo in ſmall towns and villages, where it is practicable, if the ſound remove themſelves into barracks, or the like airy habitations, it may probably be even more uſeful, than to remove the ſick. This method has been found beneficial in France after all others have failed. But the ſucceſs of this proves the method of removing the ſick, where this other cannot be practiſed, to be the moſt proper of any.

When the ſick families are gone, all the goods of the houſes in which they were, ſhould be buried deep under ground. This I prefer to burning them: becauſe, eſpecially in a cloſe place, ſome infectious particles may poſſibly be diſperſed by the ſmoke through the neighbourhood; according to what Mercurialis relates, that the plague in Venice was augmented by burning a large quantity of infected goods in the city *. A learned phyſician of my acquaintance lately communicated to me the relation of a caſe, (given to him by an apothecary, who was at the place when the the thing happened), very proper to be here mentioned. The ſtory is this. At Shipſton, a little town upon the river Stour in Worceſterſhire, a poor vagabond was ſeen walking in the ſtreets with the ſmall-pox upon him. The people frightened took care to have him carried to a little houſe, ſeated upon a hill, at ſome diſtance from the town, providing him with neceſſaries. In a few days the man died. They ordered him to be buried deep in the ground, and the houſe with his cloaths to be burnt. The wind being

* De peſtilent. cap. 21.

pretty

pretty high, blew the ſmoke upon the houſes on one ſide of the town: in that part, a few days after, eight perſons were ſeized with the ſmall-pox. So dangerous is heat in all kinds of peſtilential diſtempers, and ſo diffuſive of contagion. And moreover, the houſes themſelves may likewiſe be demoliſhed or pulled down, if that can conveniently be done; that is, if they are remote enough from others: otherwiſe it may ſuffice to have them thoroughly cleanſed, and then plaſtered up. And after this, all poſſible care ought ſtill to be taken to remove whatever cauſes are found to breed and promote contagion. In order to this, the overſeers of the poor (who might be aſſiſted herein by other officers) ſhould viſit the dwellings of all the meaner ſort of the inhabitants; and where they find them ſtifled up too cloſe and naſty, ſhould leſſen their number by ſending ſome into better lodgings, and ſhould take care, by all manner of proviſion and encouragement, to make them more cleanly and ſweet.

No good work carries its own reward with it ſo much as this kind of charity: and therefore, be the expenſe what it will, it muſt never be thought unreaſonable. For nothing approaches ſo near to the firſt original of the plague, as air pent up, loaded with damps, and corrupted with the filthineſs that proceeds from animal bodies.

Our common priſons afford us an inſtance of ſomething like this, where very few eſcape what they call the gaol-fever, which is always attended with a degree of malignity in proportion to the cloſeneſs and ſtench of the place: and it would certainly very well become the wiſdom of the government, as well with regard

to

to the health of the town, as in compaſſion to the priſoners, to take care, that all houſes of confinement ſhould be kept as airy and clean, as is conſiſtent with the uſe to which they are deſigned.

The black aſſize at Oxford, held in the caſtle there in the year 1577, will never be forgot *; at which the judges, gentry, and almoſt all that were preſent, to the number of three hundred, were killed by a poiſonous ſteam, thought by ſome to have broken forth from the earth; but by a noble and great philoſopher † more juſtly ſuppoſed to have been brought by the priſoners out of the gaol into court; it being obſerved, that they alone were not injured by it.

At the ſame time that this care is taken of houſes, the proper officers ſhould be ſtrictly charged to ſee that the ſtreets be waſhed and kept clean from filth, carrion, and all manner of nuiſances; which ſhould be carried away in the night-time: nor ſhould the layſtalls be ſuffered to be too near the city. Beggars and idle perſons ſhould be taken up, and ſuch miſerable objects as are neither fit for the common hoſpitals nor workhouſes, ſhould be provided for in an hoſpital of incurables.

Orders indeed of this kind are neceſſary to be obſerved at all times, eſpecially in populous cities; and therefore I am ſorry to take notice, that in theſe of London and Weſtminſter there is no good police eſtabliſhed in theſe reſpects: for want of which the citizens and gentry are every day annoyed more ways than one.

* Camden. annal. Regin. Eliſab. † Lord Verulam, natural hiſtory, cent. 10. num. 194.

If

If theſe early precautions we have mentioned, prove ſucceſsful, there will be no need of any methods for correcting the air, purifying houſes, or of rules for preſerving particular perſons from infection: to all which, if the plague get head, ſo that the ſick are too many to be removed, (as they will be when the diſeaſe has raged for a conſiderable time), regard muſt be had.

As to the firſt, fire has been almoſt univerſally recommended for this purpoſe, both by the ancients and moderns, who have adviſed to make frequent and numerous fires in the towns infected. This precept, I think, is almoſt entirely founded upon a tradition, that Hippocrates put a ſtop to a plague in Greece by this means. But it is to be obſerved, that there is no mention made of any thing like it in the works of Hippocrates. The beſt authority we have for it, is the teſtimony of Galen, though it is alſo mentioned by other authors. Galen, recommending Theriaca againſt the peſtilence, has thought fit, it ſeems, to compare it to fire; and, upon this conceit, relates, that Hippocrates cured a plague which came from Æthiopia into Greece by purifying the air with fires; into which were thrown ſweet-ſcented herbs and flowers, together with ointments of the fineſt flavour. It is remarkable, that among the epiſtles aſcribed to Hippocrates, which, though not genuine, yet are older than Galen, there is a decree ſaid to be made by the Athenians in honour of this father of phyſicians, which, making mention of the ſervice he had done his country in a plague, ſays only, that he ſent his ſcholars into ſeveral parts, with proper inſtructions to cure the diſeaſe By which it ſhould ſeem, that this ſtory of the fires

was

was hardly or not at all known at the time when these letters were compiled. And Soranus may yet more confirm us, that it was framed long after the death of Hippocrates: for Soranus only says in general, that Hippocrates foretold the coming of the pestilence, and took care of the cities of Greece; without any mention of having used this particular expedient. Plutarch indeed speaks of a practice like this as commonly approved among physicians, which he makes use of to illustrate a certain custom of the Egyptians: of whom he says, that they purify the air by the fumes of resin and myrrh, as physicians correct the foulness, and attenuate the thickness thereof in times of pestilence, by burning sweet-woods, juniper, cypress *, &c.

This I take to be the sum of what can be learned from antiquity in relation to this point; from whence we may see, that writers have concluded a little too hastily for the use of common fires in this case, upon the authority and example of Hippocrates, though we should allow the fact as related by Galen: when it will not from thence appear that Hippocrates himself relied upon them; since he thought it necessary to take in the assistance of aromatic fumes. But as this fact is not grounded upon sufficient authority, so it is needless to insist long upon it. The passage I have brought from Plutarch will better explain what was the sentiment of those physicians who approved the practice. It seems they expected from thence to dispel the thickness and foulness of the air. And no doubt but such evil dispositions of the air as proceed from damps, exhalations, and the like, may be corrected even by common fires, and the predisposition

* Plutarch, lib. de Isid. & Osir.

of

of it from theſe cauſes to receive infection ſometimes removed. But I think this method, if it be neceſſary, ſhould be put in practice before the coming of the peſtilence. For when the diſtemper is actually begun, and rages, ſince it is known to be ſpread and increaſed by the heat of the ſummer, and on the contrary checked by the cold in winter; undoubtedly, whatever increaſes that heat, will ſo far add force to the diſeaſe: as Mercurialis takes notice, that ſmiths, and all thoſe who worked at the fire, were moſt ſeverely uſed in the plague at Venice in his time *. Whether the ſervice fires may do by correcting any other ill qualities of the air, will counterbalance the inconvenience upon this account, experience only can determine: and the fatal ſucceſs of the trials made here in the laſt plague, is more than ſufficient to diſcourage any farther attempts of this nature. For fires being ordered in all the ſtreets for three days together, there died in one night following no leſs than four thouſand, (if we may believe Dr Hodges); whereas in any ſingle week before or after, never twice that number were carried off †. And we find, that, upon making the ſame experiment in the laſt plague at Marſeilles, the contagion was every day ſpread more and more through the city with increaſed rage and violence ‡.

What has been ſaid of fires, is likewiſe to be underſtood of firing of guns, which ſome have too raſhly adviſed. The proper correction of the air would

* De peſte, c. 22. † Hodges de peſte, p. 24.
‡ Journal de la peſte de Marſeilles, p. 19. & relation hiſtorique de tout ce qui s'eſt paſſé à Marſeilles pendant la derniere peſte, p. 77.

be to make it freſh and cool: accordingly the Arabians *, who were beſt acquainted with the nature of peſtilences, adviſe people to keep themſelves as airy as poſſible, and to chuſe dwellings expoſed to the wind, ſituate high, and refreſhed with running waters.

As for houſes, the firſt care ought to be to keep them clean: for as naſtineſs is a great ſource of infection, ſo cleanlineſs is the greateſt preſervative; which ſhews us the true reaſon, why the poor are moſt obnoxious to contagious diſeaſes. It is remarked of the Perſians, that though their country is ſurrounded every year with the plague, they ſeldom or never ſuffer any thing by it themſelves: and it is likewiſe known, that they are the moſt cleanly people of any in the world, and that many among them make it a great part of their religion to remove filthineſs and nuiſances of every kind from all places about their cities and dwellings †.

Beſides this, the Arabians adviſe the keeping houſes cool, as another method of their purification; and therefore, to anſwer this end more fully, they directed to ſtrew them with cooling herbs, as roſes, violets, water-lilies, &c. and to be waſhed with water and vinegar: than all which, eſpecially the laſt, nothing more proper can be propoſed. I think it not improper likewiſe to fume houſes with vinegar, either alone or together with nitre, by throwing it upon a hot iron or tile; though this be directly contrary to what modern authors moſtly adviſe, which

* Rhazes de re medica, lib. iv. c. 24. & Avicenn. can. med. lib. iv. c. 1. † Gauderau relation des eſpeces de la peſte que reconnoiſſent les Orientaux.

is

is to make fumes with hot things, as benzoin, frankincenſe, ſtorax, &c. from which I ſee no reaſon to expect any virtue to deſtroy the matter of infection, or to keep particular places from a diſpoſition to receive it; which are the only things here to be aimed at. The ſmoke of ſulphur, perhaps, as it abounds with an acid ſpirit, which is found by experience to be very penetrating, and to have a great power to repreſs fermentations, may promiſe ſome ſervice this way.

As hot fumes appear to be generally uſeleſs, ſo the ſteams of poiſonous minerals ought to be reckoned dangerous: and therefore I cannot but diſſuade the uſe of all fumigations with mercury or arſenic. Much leſs would I adviſe, as ſome have done, the wearing arſenic upon the pit of the ſtomach as an amulet: ſince this practice has been often attended with very ill conſequences, and is not grounded upon any good authority, but probably derived from an errour in miſtaking the Arabian word *darſini*, which ſignifies cinnamon, for the Latin *de arſenico*, as I have formerly ſhewn *.

The next thing after the purifying of houſes, is to conſider by what means particular perſons may beſt defend themſelves againſt contagion: for the certain doing of which, it would be neceſſary to put the humours of the body into ſuch a ſtate, as not to be alterable by the matter of infection. But ſince this is no more to be hoped for, than a ſpecific preſervative from the ſmall-pox; the moſt that can be done, will be to keep the body in ſuch order, that it may ſuffer as little as poſſible. The firſt ſtep towards which,

* Mech. account of poiſons, eſſay 3.

is to maintain a good ſtate of health, in which we are always leaſt liable to ſuffer by any external injuries; and not to weaken the body by evacuations. The next is, to guard againſt all dejection of ſpirits, and immoderate paſſions: for theſe we daily obſerve do expoſe perſons to the more common contagion of the ſmall-pox. Theſe ends will be beſt anſwered by living with temperance upon a good generous diet, and by avoiding faſtings, watchings, extreme wearineſs, &c. Another defence is, to uſe whatever means are proper to keep the blood from inflaming. This, if it does not ſecure from contracting infection, will at leaſt make the effects of it leſs violent. The moſt proper means for this, according to the advice of the Arabian phyſicians, is the repeated uſe of acid fruits, as pomegranates, Sevil oranges, lemons, tart apples, &c.; but above all, of wine-vinegar in ſmall quantities, rendered grateful to the ſtomach by the infuſion of ſome ſuch ingredients as gentian root, galangal, zedoary, juniper berries, &c. Which medicines by correcting the vinegar, and taking off ſome ill effects it might otherwiſe have upon the ſtomach, will be of good uſe: but theſe, and all other hot aromatic drugs, though much recommended by authors, if uſed alone, are moſt likely to do hurt by overheating the blood.

I cannot but recommend likewiſe the uſe of iſſues. The propereſt place for them I take to be the inſide of the thigh a little above the knee. Beſides, the ſmoking tobacco, much applauded by ſome, ſince it may be put in practice without any great inconvenience, need not, I think, be neglected.

But ſince none of theſe methods promiſe any certain

tain protection; as leaving the place infected is the ſureſt preſervative, ſo the next to it is to avoid, as much as may be, the near approach to the ſick, or to ſuch as have but lately recovered. For the greater ſecurity herein, it will be adviſeable to avoid all crouds of people. Nay, it ſhould be the care of the magiſtrate to prohibit all unneceſſary aſſemblies; and likewiſe to oblige all who get over the diſeaſe, to confine themſelves for ſome time, before they appear abroad.

The advice to keep at a diſtance from the ſick, is alſo to be underſtood of the dead bodies; which ſhould be buried at as great a diſtance from dwelling-houſes, as may be; put deep in the earth; and covered with the exacteſt care; but not with quick-lime thrown in with them, as has been the manner abroad: for I cannot but think that this, by fermenting with the putrefying humours of the carcaſes, may give riſe to noxious exhalations from the ground. They ſhould likewiſe be carried out in the night, while they are yet freſh and free from putrefaction: becauſe a carcaſe not yet beginning to corrupt, if kept from the heat of the day, hardly emits any kind of ſteam or vapour.

As for thoſe who muſt of neceſſity attend the ſick, ſome farther directions ſhould be added for their uſe. Theſe may be comprehended in two ſhort precepts. One is, not to ſwallow their ſpittle while they are about the ſick, but rather to ſpit it out: the other, not ſo much as to draw in their breath, when they are very near them. The reaſon for both theſe appears from what has been ſaid above concerning the manner in which a ſound perſon receives the infection.

tion. But in caſe it be too difficult conſtantly to comply with theſe cautions, waſhing the mouth frequently with vinegar, and holding to the noſtrils a ſponge wet with the ſame, may in ſome meaſure ſupply their place.

This is the ſum of what I think moſt likely to ſtop the progreſs of the diſeaſe in any place where it ſhall have got admittance. If ſome few of theſe rules refer more particularly to the city of London, with ſmall alteration they may be applied to any other place. It now remains therefore only to lay down ſome directions to hinder the diſtemper's ſpreading from town to town. The beſt method for which, where it can be done, (for this is not practicable in very great cities), is to caſt up a line about the town infected, at a convenient diſtance; and by placing a guard, to hinder people's paſſing from it without due regulation, to other towns: but not abſolutely to forbid any to withdraw themſelves, as was done in France, according to the uſual practice abroad; which is an unneceſſary ſeverity, not to call it a cruelty. I think it will be enough, if all who deſire to paſs the line, be permitted to do it, upon condition they firſt perform quarantine for about twenty days in tents, or other more convenient habitations. But the greateſt care muſt be taken, that none paſs without conforming themſelves to this order; both by keeping diligent watch, and by puniſhing, with the utmoſt ſeverity, any that ſhall either have done ſo, or attempt it. And the better to diſcover ſuch, it will be requiſite to oblige all who travel in any part of the country, under the ſame penalties, to carry with them certificates

certificates either of their coming from places not infected, or of their paſſing the line by permiſſion.

This I take to be a more effectual method to keep the infection from ſpreading, than the abſolute refuſing a paſſage to people upon any terms. For when men are in ſuch imminent danger of their lives where they are, many, no doubt, if not otherwiſe allowed to eſcape, will uſe endeavours to do it ſecretly, let the hazard be ever ſo great. And it can hardly be, but ſome will ſucceed in their attempts; as we ſee it has often happened in France, notwithſtanding all their care. But one that gets off thus clandeſtinely, will be more likely to carry the diſtemper with him, than twenty, nay, a hundred, that go away under the preceding reſtrictions; eſpecially becauſe the infection of the place he flies from, will by this management be rendered much more intenſe. For confining people, and ſhutting them up together in great numbers, will make the diſtemper rage with augmented force, even to the increaſing it beyond what can be eaſily imagined: as appears from the account which the learned Gaſſendus * has given us of a memorable plague, which happened at Digne in Provence, where he lived, in the year 1629. This was ſo terrible, that in one ſummer, out of ten thouſand inhabitants, it left but fifteen hundred, and of them all but five or ſix had gone through the diſeaſe. And he aſſigns this, as the principal cauſe of the great deſtruction, that the citizens were too cloſely confined, and not ſuffered ſo much as to go to their country-houſes. Whereas in another peſtilence which broke out in the ſame place a year and a half after, more

* Notitia eccleſiæ Dinienſis.

liberty

liberty being allowed, there did not die above one hundred perſons.

For theſe reaſons, I think, to allow people with proper cautions to remove from an infected place, is the beſt means to ſuppreſs the contagion, as well as the moſt humane treatment of the preſent ſufferers: and, under theſe limitations, the method of inveſting towns infected, which is certainly the moſt proper that can be adviſed, to keep the diſeaſe from ſpreading, will be no inconvenience to the places furrounded. On the contrary, it will rather be uſeful to them; ſince the guard may eſtabliſh ſuch regulations for the ſafety of thoſe who ſhall bring proviſions, as ſhall remove the fears which might otherwiſe diſcourage them.

The ſecuring againſt all apprehenſions of this kind, is of ſo great importance, that in cities too large to be inveſted, as, for example, this city of London, the magiſtrates muſt uſe all poſſible diligence to ſupply this defect, not only by ſetting up barriers without their city, but by making it in the moſt particular manner their care to appoint ſuch orders to be obſerved at them, as they ſhall judge will be moſt ſatisfactory to the country about. Though liberty ought to be given to the people, yet no ſort of goods muſt by any means be ſuffered to be carried over the line which are made of materials retentive of infection. For in the preſent caſe, when infection has ſeized any part of a country, much greater care ought to be taken, that no ſeeds of the contagion be conveyed about, than when the diſtemper is at a great diſtance: becauſe a bale of goods, which ſhall have imbibed the contagious aura when packed up in Turky, or any

remote

remote parts; when unpacked here, may chance to meet with ſo healthful a temperament of our air, that it ſhall not do much hurt. But when the air of any one of our towns ſhall be ſo corrupted, as to maintain and ſpread the peſtilence in it, there will be little reaſon to believe, that the air of the reſt of the country is in a much better ſtate.

For the ſame reaſon quarantines ſhould more ſtrictly be injoined, when the plague is in a bordering kingdom, than when it is more remote.

The advice here given with reſpect to goods, is not only abundantly confirmed from the proofs I have given above, that goods have a power of ſpreading contagion to diſtant places; but might be farther illuſtrated by many inſtances of ill effects from the neglect of this caution in times of the plague. I ſhall mention two, which happened among us during the laſt plague. I have had occaſion already to obſerve, that the plague was in Poole. It was carried to that place by ſome goods contained in a pedlar's pack. The plague was likewiſe at Eham in the Peak of Derbyſhire, being brought thither by means of a box ſent from London to a tailor in that village, containing ſome materials relating to his trade. There being ſeveral incidents in this latter inſtance, that will not only ſerve to eſtabliſh in particular the precepts I have been giving in relation to goods, but likewiſe all the reſt of the directions that have been ſet down for ſtopping the progreſs of the plague from one town to another; I ſhall finiſh this chapter with a particular relation of what paſſed in that place. A ſervant, who firſt opened the foreſaid box, complaining that the goods were damp, was ordered to dry them at the fire;

but in doing it was ſeized with the plague, and died: the ſame misfortune extended itſelf to all the reſt of the family, except the tailor's wife, who alone ſurvived. From hence the diſtemper ſpread about, and deſtroyed in that village, and the reſt of the pariſh, though a ſmall one, between two and three hundred perſons. But, notwithſtanding this ſo great violence of the diſeaſe, it was reſtrained from reaching beyond that pariſh by the care of the rector; from whoſe ſon, and another worthy gentleman, I have the relation. This clergyman adviſed, that the ſick ſhould be removed into huts or barracks built upon the common; and procuring, by the intereſt of the then Earl of Devonſhire, that the people ſhould be well furniſhed with proviſions, he took effectual care, that no one ſhould go out of the pariſh: and by this means he protected his neighbours from infection with complete ſucceſs.

I have now gone through the chief branches of preſervation againſt the plague, and ſhall conclude with ſome general directions concerning the cure.

CHAP. III.

Of the cure of the plague.

IT appears, from what has been ſaid in the beginning of this diſcourſe, that the plague and the ſmall-pox are diſeaſes which bear a great ſimilitude to each other; both being contagious fevers from Africa, and both attended with certain eruptions. And as the eruptions or puſtules in the ſmall-pox are of two kinds, which has cauſed the diſtemper to be divided

vided into two ſpecies, the diſtinct and confluent; ſo we have ſhewn two ſorts of eruptions or tumours likewiſe to attend the plague. In the firſt and mildeſt kind of the ſmall-pox the puſtules riſe high above the ſurface of the ſkin, and contain a digeſted pus: but in the other, the puſtules lie flat, and are filled with an indigeſted ſanies. The two kinds of critical tumours in the plague are yet more different. In the moſt favourable caſe the morbific matter is thrown upon ſome of the ſofteſt glands near the ſurface of the body, as upon the inguinal, axillary, parotid, or maxillary glands: the firſt appearance of which is a ſmall induration, great heat, redneſs, and ſharp pain near thoſe glands. Theſe tumours, if the patient recover, like the puſtules of the diſtinct ſmall-pox, come to a juſt ſuppuration, and thereby diſcharge the diſeaſe. In worſe caſes of the diſtemper, either inſtead of theſe tumours, or together with them, carbuncles are raiſed. The firſt appearance of them is a very ſmall indurated tumour, not ſituate near any of the forementioned glands, with a duſky redneſs, violent heat, vaſt pain, and a blackiſh ſpot in the middle of the tumour. This ſpot is the beginning of a gangrene, which ſpreads itſelf more and more as the tumour increaſes.

But, beſides the agreement in theſe critical diſcharges, the two diſtempers have yet a more manifeſt likeneſs in thoſe livid and black ſpots, which are frequent in the plague, and the ſigns of ſpeedy death: for the ſame are ſometimes found to attend the ſmall-pox with as fatal a conſequence; nay, I have ſeen caſes, when almoſt every puſtule has taken this appearance. Moreover, in both diſeaſes, when emi-

nently malignant, blood is ſometimes voided by the mouth, by urine, or the like *. And we may farther add, that in both death is uſually cauſed by mortifications in the viſcera. This has conſtantly been found in the plague by the phyſicians in France; and I am convinced, from accounts I have by me, of the diſſection of a great many who had died of the ſmall pox, that it is the ſame in that diſtemper.

This analogy between the two diſeaſes, not only ſhews us, that we cannot expect to cure the plague any more than the ſmall-pox, by antidotes and ſpecific medicines; but will likewiſe direct us in the cure of the diſtemper, with which we are leſs acquainted, by the methods found uſeful in the other diſeaſe, which is more familiar to us.

In ſhort, as in the ſmall-pox, the chief part of the management conſiſts in clearing the primæ viæ in the beginning; in regulating the fever; and in promoting the natural diſcharges: ſo in the plague the ſame indications will have place. The great difference lies in this, that in the plague the fever is often much more acute than in the other diſtemper; the ſtomach and bowels are ſometimes inflamed; and the eruptions require external applications, which to the puſtules of the ſmall-pox are not neceſſary.

When the fever is very acute, a cool regimen commonly ſo beneficial in the ſmall-pox, is here ſtill more neceſſary. But whenever the pulſe is languid, and the heat not exceſſive, moderate cordials muſt be uſed.

The diſpoſition of the ſtomach and bowels to be

* Vid. obſerv. et reflex. ſur la peſte de Marſeilles, p. 333.

inflamed,

inflamed, makes vomiting not ſo generally ſafe in the plague as in the ſmall-pox. The moſt gentle emetics ought to be uſed, none better than ipecacuanha; and great caution muſt be had, that the ſtomach or bowels are not inflamed, when they are adminiſtered: for if they are, nothing but certain death can be expected from them: otherwiſe, at the beginning, they will be always uſeful. Therefore upon the firſt illneſs of the patient it muſt carefully be conſidered, whether there appear any ſymptoms of an inflammation having ſeized theſe parts: if there are any marks of this, all vomits muſt be omitted; if not, the ſtomach ought to be gently moved.

The eruptions, whether glandular tumours, or carbuncles, muſt not be left to the courſe of nature, as is done in the ſmall-pox; but all diligence muſt be uſed, by external applications, to bring them to ſuppurate. Both theſe tumours are to be treated in moſt reſpects alike. As ſoon as either of them appears, fix a cupping-glaſs to it without ſcarifying; and when that is removed, apply a ſuppurative cataplaſm, or plaſter of warm gums.

If the tumours do not come to ſuppuration, which the carbuncle ſeldom or never does; but if a thin ichor or matter exudes through the pores; or if the tumour feel ſoft to the touch; or laſtly, if it has a black cruſt upon it, then it muſt be opened by inciſion, either according to the length of the tumour, or by a crucial ſection. And if there is any part mortified, as is uſual in the carbuncle, it muſt be ſcarified. This being done, it will be neceſſary to ſtop the bleeding, and dry up the moiſture with an actual cautery, dreſſing the wound afterwards with doſſils,

doſſils, and pledgets ſpread with the common digeſtive made with terebinth. cum vitel. ov. and dipped in a mixture of two parts of warmed oil of turpentine, and one part of ſp. ſal. ammon. or in balſ. terebinth. and over all muſt be put a cataplaſm of theriac. Lond.

The next day the wound ought to be well bathed with a fomentation made of warm aromatic plants, with ſpirit of wine in it; in order, if poſſible, to make the wound digeſt, by which the ſloughs will ſeparate. After this the ulcer may be treated as one from an ordinary abſceſs.

Farther, in the glandular tumours, when they ſuppurate, we ought not to wait, till the matter has made its way to the outer ſkin, but to open it as ſoon as it is riſen to any bigneſs: becauſe theſe tumours begin deep in the gland, and often mortify, before the ſuppuration has reached the ſkin, as the phyſicians in France have found upon diſſecting many dead bodies.

This is the method in which the plague muſt be treated in following the natural courſe of the diſtemper. But the patient in moſt caſes runs ſo great hazard in this way, notwithſtanding the utmoſt care, that it would be of the greateſt ſervice to mankind under this calamity, if ſome artificial diſcharge for the corrupted humours could be found out, not liable to ſo great hazard, as the natural way. To this purpoſe large bleeding and profuſe ſweating are recommended to us upon ſome experience.

Dr Sydenham tried both theſe evacuations with good ſucceſs, and has made two very judicious remarks upon them. The firſt is, that they ought

not

not to be attempted unleſs in the beginning of the ſickneſs, before the natural courſe of the diſtemper has long taken place: becauſe otherwiſe we can only expect to put all into confuſion without any advantage. His other obſervation is, that we cannot expect any proſperous event from either of theſe evacuations, unleſs they are very copious; there being no proſpect of ſurmounting ſo violent a malignity without bolder methods than muſt be taken in ordinary caſes.

As for bleeding, by ſome accounts from France, I have been informed, that ſome of the phyſicians there have carried this practice ſo far, as, upon the firſt day of the diſtemper, to begin with bleeding about twelve ounces, and then to take away four or five ounces every two hours after. They pretend to extraordinary ſucceſs from this method, with the aſſiſtance only of cooling ptiſans, and ſuch like drinks, which they give plentifully at the ſame time. Such profuſe bleeding as this may perhaps not ſuit with our conſtitutions ſo well as with theirs; for in common caſes they uſe this practice much more freely than we: yet we muſt draw blood with a more liberal hand than in any other caſe, if we expect ſucceſs from it. I ſhall excuſe myſelf from defining exactly how large a quantity of blood is requiſite to be drawn, for want of particular experience: but I think fit to give this admonition, that, in ſo deſperate a caſe as this, it is more prudent to run ſome hazard of exceeding, than to let the patient periſh for want of due evacuation.

As for ſweating, which is the other method propoſed, it ought, no doubt, to be continued without intermiſſion full twenty-four hours, as Dr Sydenham adviſes.

adviſes. He is ſo particular in his directions about it, that I need ſay little. I ſhall only add, that theriaca, and the like ſolid medicines, being offenſive to the ſtomach, are not the moſt proper ſudorifics. I ſhould rather commend an infuſion in boiling water of Virginia ſnake-root, or in want of this, of ſome other warm aromatic, with the addition of about a fourth part of aqua theriacalis, and a proper quantity of ſyrup of lemons to ſweeten it. From which, in illneſſes of the ſame kind with the gaol-fever, which approaches the neareſt to the peſtilence, I have ſeen very good effects.

Whether either of theſe methods of bleeding or of ſweating will anſwer the purpoſe intended by them, muſt be left to a larger experience to determine; and the trial ought by no means to be neglected, eſpecially in thoſe caſes which promiſe but little ſucceſs from the natural courſe of the diſeaſe.

A DISCOURSE on the SMALL-POX and MEASLES.

PREFACE.

A Conſiderable part of this diſcourſe was written by me many years ſince; and the whole had been finiſhed and given to the public long ago, would the buſineſs of my profeſſion, in which I have been conſtantly engaged, have allowed me time to do it. However, I flatter myſelf, that this intermiſſion of the work will in the main turn to the advantage of the reader: becauſe whatever inconveniencies may attend age, they are for the moſt part amply compenſated by daily acquiſitions of knowledge and experience. Wherefore, without farther apology, I ſhall now briefly lay down the motives which firſt induced me to write on this ſubject.

In the year 1717 the learned Dr Freind publiſhed the firſt and third books of Hippocrates's epidemics, illuſtrated with nine commentaries concerning fevers. Of theſe the ſeventh treats of purging in the putrid fever, which follows upon the confluent ſmall-pox; and, in ſupport of his opinion, he has annexed to it the letters of four phyſicians to himſelf on that ſubject; one of which is mine. For after having been ſeveral years one of the phyſicians to St Thomas's hoſpital, in the year 1708, I obſerved, that ſome of my patients recovered from a very malignant ſort of ſmall-pox, even beyond expectation, by a looſeneſs ſeizing them on the ninth or tenth day of the diſeaſe,

and ſometimes earlier. Hence I took the hint, to try what good might be done by opening the body with a gentle purge on the decline of the diſtemper, eſpecially where the patient had conſtantly been coſtive from the beginning; which is far from being an uncommon caſe. The ſucceſs was in a great meaſure anſwerable to my wiſhes: for, by this method, I recovered many who were in the moſt imminent danger.

At that time, and indeed during the remainder of his life, I was ſtrictly joined in friendſhip with Dr Freind; and as we frequently converſed on the buſineſs of our profeſſion, I explained this point of practice to him, and met with his approbation. Soon after this, he was called to a conſultation with two other eminent phyſicians, on the caſe of a young nobleman, who lay dangerouſly ill of the ſmall-pox: whereupon he propoſed my method. But they obſtinately oppoſed it until the fourteenth day from the eruption, when the caſe appearing quite deſperate by convulſions with a lethargy coming on apace, they conſented to give him a gentle laxative draught; which had a very good effect. Hereupon Dr Freind gave his opinion to repeat it; but that was over-ruled, and the patient died the ſeventh day after. The doctor himſelf has given an ample account of this caſe *.

This affair ſoon made ſo great a noiſe, that even the gentlemen of the faculty were divided upon it; ſome commending, others finding fault with Dr Freind's advice: which ſo eſſentially affected his reputation, that he thought himſelf under a neceſſity of

* Freindi opera, p. 263.

vindicating

vindicating it: and therefore he entreated me to ſend him the purport of our former converſation in writing. Such was our friendſhip, that I ſoon complied with his requeſt; and he ſhewed my letter to Dr Radcliffe, (who at that time was very deſervedly at the head of his profeſſion, upon acccount of his great medical penetration and experience, and had honoured me with a conſiderable ſhare of intimacy), and told him withal, that he intended to publiſh his defence. Whereupon Dr Radcliffe obtained leave of me for Dr Freind to annex my letter to his book. But after two or three ſheets had been printed off, he was prevailed on by ſome friends to drop his undertaking: and thus both his work and my letter lay by for ſome years, that is, until he publiſhed his commentaries on fevers. While he was employed in this work, he had freſh thoughts of printing the aforeſaid letter with it; for which purpoſe I reviſed and enlarged the letter, tranſlated it from the original Engliſh into Latin, and, in ſhort, new-modelled it into the form in which it appears in that book.

It very rarely happens, that a new method of cure in any diſeaſe gives univerſal ſatisfaction: however, not only Dr Freind and myſelf invariably perſiſted in this from the firſt time I mentioned it to him; but ſeveral phyſicians likewiſe, both in town and country, to whom we imparted it, found its ſalutary effects. But there never are wanting ſome men of ſo invidious a turn of mind, that their principal pleaſure conſiſts in blackening the reputation, and decrying the productions of others; as if what they ſtrip their neighbours of, was to be added to their own characters. Thus Dr Freind's book had no ſooner appeared in public,

but ſome of this ſtamp flew to arms, as if to ſave the commonwealth. In front of this band ſtood forth Dr John Woodward, phyſic-profeſſor at Greſham-college, a man equally ill-bred, vain, and ill-natured, who, after being for ſome time apprentice to a linen-draper, took it into his head to make a collection of ſhells and foſſils, in order to paſs upon the world for a philoſopher; thence having got admiſſion into a phyſician's family, at length, by dint of intereſt, obtained a doctor's degree. This man publiſhed a book, entitled, *The ſtate of phyſic and diſeaſes* *, wherein he took great liberties with Dr Freind, and thoſe in the ſame ſentiment with him, but pointed his arrows moſt particularly at me; and theſe were neither arguments nor experiments, of which he had none, but barefaced calumny and raillery, which he poured forth in abundance. It is much againſt my will, that I thus revive the remembrance of that libel, which already is well nigh ſunk into oblivion; and for which the author has been juſtly expoſed by Dr Freind: nor ſhould I have waſted paper on this inſignificant ſtory, had not the arrogance and vanity of the man extorted it from me. And, in fine, if I have dwelt longer on this whole affair than might be expected, my motives were, firſt, to explain who was the author of this method of practice, and then, how little foundation Dr Woodward had for his perſonal reflections and brawling.

Now, as to what concerns this diſcourſe, I muſt inform the public, that I have preferred perſpicuity to flowers of language, by delivering every precept in as few words as to me ſeemed conſiſtent with a clear

* London, 1718, 8vo.

conveyance

conveyance of my notions: and I have added some particular rules and cautions relating to cathartics, for the sake of young physicians chiefly; who are often disposed too rashly to attempt, and too eagerly to embrace every novelty in practice, especially when handed down to them from persons of whom they have a high opinion. For nothing can be so universally useful, as not to be liable to some exception; and it is sometimes as great a mark of sound judgment, not to do mischief, as to do good *. Wherefore, not only in this case, but in all others within the compass of our art, the physician ought constantly to remember that of the poet †,

Nothing does good, but what may also hurt.

When I had finished this small work, I thought it might be no less agreeable than useful to the gentlemen of the faculty, if to it I annexed Rhazes's treatise of the small-pox and measles, faithfully translated from the original Arabic into Latin: as it contains an ample detail of many things relating to the nature and cure of these diseases, which, making proper allowances for time and place, coincide pretty much with the doctrines I have laid down. And indeed, it has given me no small pleasure, to see my sentiments confirmed by the greatest physician of the age he lived in. But I have often wondered how it came to pass, that this book had never before been published either in Arabic, or in Latin from the Arabic. Robert Stephens was the first who published it in Greek, at the end of his edition of Alexander Trallian's work in the

* Hippocrates in his first book of epidemics.

† Ovid. trist. lib. ii. ver. 266.

year

year 1548 *. The Greek copy has been tranſlated into Latin by three ſeveral perſons; the firſt of whom was Georgius Valla of Placentia, whoſe verſion was publiſhed at Venice, A. D. 1498, and went through ſeveral editions. This was followed by a ſecond, done by Johannes Guinterius of Andernac, printed at Straſbourg in 1549: and Nicolaus Macchellus, a phyſician of Modena, put forth a third, printed at Venice, in 1555, and again, in 1586 †. Now, the Greek copy was not tranſlated directly from the Arabic, but from a Syriac verſion, which latter ſeems to have been done for the uſe of the common people; and upon comparing the Greek with this Latin tranſlation from the Arabic, which I now publiſh, it will appear very inaccurate, by the entire omiſſion of ſome things, and faulty rendering of others; whether through the inſufficiency, or negligence of the Syriac or Greek tranſlator, I ſhall not determine. But the manner how I acquired my copy is this.

After having cauſed a diligent ſearch to be made in our public libraries for an Arabic copy of this treatiſe to no purpoſe, I wrote to my good friend the celebrated Dr Boerhaave, profeſſor of phyſic in the univerſity of Leyden, entreating him to inform me, if ſuch an one could be found in the public library there, which I knew to be very rich in Arabic manuſcripts. A copy was accordingly found, which he got tranſcribed by the Arabic profeſſor, and kindly ſent it over to me; but it proved to be full of faults. This, however, I gave at two ſeparate times to two gentlemen of character, to put it into Latin. One was So-

* The Greek title is, Ῥαζῆ λόγος περὶ λοιμικῆς.
† Vid. Fabricii bibl. Græc. vol. xii. p. 692.

Iomon

lomon Negri, a native of Damaſcus, extremely well verſed in all the oriental tongues; the other John Gagnier, Arabic reader at Oxford: and they both performed the taſk with great diligence. But upon comparing the two verſions I obſerved that they differed in ſeveral places, not in the diction only, but even in the ſenſe: wherefore, as I have no knowledge of the Arabic tongue, I could not determine which of the two to prefer. This uncertainty made me apply to my worthy friend, the Reverend Dr Thomas Hunt, for ſeveral years paſt Arabic profeſſor in the univerſity of Oxford, and lately made Hebrew profeſſor likewiſe, who, among his many eminent qualities, is univerſally eſteemed a great maſter of the eaſtern languages. This gentleman, at my requeſt, generouſly undertook the province of ſtrictly collating the two Latin verſions above mentioned with the Arabic copy, in my preſence; and out of them he compiled this, which I now give to the public; and doubtleſs he would have made it much better, had the Arabic copy been more correct.

London, Sept. 29.
1747.

A DISCOURSE on the SMALL-POX and MEASLES.

CHAP. I.

Of the origin of the ſmall-pox.

BEfore I enter on the medical part of my ſubject, I ſhall briefly inquire into the origin of the ſmall-pox, and the manner of its propagation from thoſe countries where it firſt appeared, almoſt over the whole face of the earth, as far as I can trace it in hiſtory: for theſe points once ſettled will throw a conſiderable light on the nature of the diſtemper, and the methods of cure, which I ſhall propoſe in the ſequel of the diſcourſe.

That this is a modern diſeaſe, whereby I mean, that it was not known to the ancient Greek and Roman phyſicians, is to me a matter beyond all doubt. For I think they are widely miſtaken who endeavour to prove, that the anthrax, epinyctis, and ſuch like eruptions on the ſkin, were our ſmall-pox: becauſe it is more than probable, that the ancient phyſicians, who were extremely diligent in the deſcription and diſtinctive characteriſtics of all diſeaſes, would not have been content with barely mentioning this, which is ſo contagious, and makes ſuch dreadful havock among mankind; but would have minutely deſcribed it, had they been acquainted with it.

Wherefore we muſt have recourſe to the writings of the Arabian phyſicians for the firſt notices of this diſeaſe. The chief of theſe was Rhazes, who lived about

about the year of Chriſt 900. We have a large volume of this great man, publiſhed under the title of his *Continent*, a treaſure of phyſic, which ſeems to have been compiled from his common-place book. In this he informs us, that a phyſician, whoſe name was Aaron, (who wrote thirty books of phyſic), had treated of the diagnoſtics, the various kinds, and the method of cure of the ſmall-pox *. Now, this Aaron was born at Alexandria, and in the reign of Mohammed practiſed about the year 622 †. Whence the learned Dr Freind conjectured, that poſſibly the ſmall-pox took its riſe in Egypt ‡. But the origin of the diſeaſe is carried farther back than the time of this Aaron, by Dr John James Reiſke, who ſays that he read the following words in an old Arabic manuſcript of the public library at Leyden: "This year, in fine, the ſmall-"pox and meaſles made their firſt appearance in Ara-"bia ‖." By this year he means that of the birth of Mohammed, which was the year of Chriſt 572.

Now, upon mature conſideration of the whole affair, I am inclined to think that there are certain diſeaſes, which are originally engendered and propagated in certain countries, as in their native ſoil. Theſe by Hippocrates are called diſeaſes of the country †; and ſome of them, ſprung up in various parts of Europe and Aſia, from peculiar defects in the air, ſoil, and waters, he has moſt accurately deſcribed ← : but the more modern Greeks call them *endemic diſeaſes* ↔.

* Contin. 419. 2. † Vid. Abulpharajii hiſt. dynaſt. p. 99. ‡ Oper. p. 330. ‖ Hoc demum anno comparuerunt primum in terris Arabum variolæ & morbilli. Diſp. inaug. Lug. Bat. 1746.

† Νυσήματα ἐπιχώρια. ← Lib. de aëre, aquis, & locis. ↔ Ἐνδημίους. Vid. Galen. com. i. in epidem. Hip.

Theſe, in my opinion, always exiſted in their reſpective native places, as proceeding from the ſame natural cauſes perpetually exerting themſelves.

It is found by experience, that ſome of theſe are contagious, and that the contagion is frequently propagated to very remote countries by means ſuitable to the nature of this or that diſeaſe. For ſome not only communicate the infection by immediate contact of the ſound with the morbid body, but have ſuch force, that they ſpread their pernicious ſeeds by emitting very ſubtile particles; which lighting on ſoft ſpongy ſubſtances, ſuch as cotton, wool, raw-ſilk, and cloathing, penetrate into them, and there remain pent up for a conſiderable time: in the ſame manner as I have elſewhere accounted for the wide progreſs of the plague from Africa its original country *. Others, on the contrary, are infectious by contact alone. Wherefore the firſt ſort may be ſpread by commerce, but the latter by cohabitation only.

Of this kind is the venereal diſeaſe; which, according to hiſtorians of the moſt undoubted credit, is a native of ſome of the American iſlands, eſpecially Hiſpaniola, and was brought over into Spain near the end of the fifteenth century: thence, in the year 1495, it was carried to Naples, during the war between Ferdinand of Arragon and the French, by ſome Spaniſh troops, who had contracted it in the aforeſaid iſland. For theſe and the French ſoldiers having at different times had communication with the ſame women, according as the ſame towns alternately fell into the hands of the two contending parties; this filthy diſeaſe firſt ſpread itſelf over the two armies,

* Diſcourſe on the plague, part i. chap. i.

thence

thence made its way into Italy, and has ſince infected moſt parts of the habitable world *.

And I very well remember, that a certain Engliſh merchant, who had reſided many years in Muſcovy, aſſured me, that the venereal diſeaſe was hardly known in that country before the reign of the late Czar Peter the Great: becauſe till that time the traffic carried on by the Muſcovites did not require much communication or dealing with foreigners. But after that emperour had taken the reſolution of viſiting other parts of Europe, and had ſent many of his ſubjects abroad to learn trades and manufactures; theſe carried back with them the dire effects of their unlawful luſt into their native country; which raged there with the greater ſeverity, as inflammations and ulcers are the more difficult to be cured in cold climates.

But to return to the ſmall-pox: I really take this diſeaſe to be a plague of its own kind, which was originally bred in Africa, and more eſpecially in Æthiopia, as the heat is exceſſive there; and thence, like the true plague, was brought into Arabia and Egypt after the manner above mentioned.

Now, if any one ſhould wonder why this contagion was ſo long confined to its native ſoil, without ſpreading into diſtant countries: I pray him to conſider, that foreign commerce was much more ſparingly carried on in ancient times, than in our days, eſpecially between mediterranean nations; and likewiſe, that the ancients ſeldom or never undertook long voyages by ſea, as we do. And Ludolfus obſerves that the Ethiopians in particular were ignorant of

* Vid. Aſtruc de morbis venereis, lib. i. cap. 10. 11.

mercantile affairs *. Therefore, when in proceſs of time the mutual intercourſe of different nations became more frequent by wars, trade, and other cauſes; this contagious diſeaſe was ſpread far and wide. But towards the end of the eleventh century, and in the beginning of the twelfth, it gained vaſt ground, by means of the wars waged by a confederacy of the Chriſtian powers againſt the Saracens, for the recovery of the Holy Land; this being the only viſible recompenſe of their religious expeditions, which they brought back to their reſpective countries. From that time forward, whereſoever this moſt infectious diſtemper once got a footing, there it has obſtinately held uninterrupted poſſeſſion. For the purulent matter, which runs out of the puſtules, being caught in the bed-cloaths and wearing apparel of the ſick, and there drying, and remaining inviſible, becomes a nurſery of the diſeaſe, which ſoon breaks forth on thoſe who happen to come in contact with it; eſpecially, if the ſeaſon of the year, and ſtate of the air, be favourable to its action.

In this place, it may not be improper, in confirmation of the foregoing doctrine, to relate the following fact, which was atteſted to me by a gentleman of great experience, who had been for many years governour of Fort St George in the Eaſt Indies. While he was in that poſt, a Dutch ſhip put into the Cape of Good Hope, ſome of the crew of which had had the ſmall-pox in the voyage thither. The natives of that country, who are called *Hottentots*, are ſo wild and ſtupid, that they might ſeem to be of a middle ſpecies between men and brutes; and it is their cu-

* Hiſt. Æthiop. lib. iv. cap. 7.

ſtom

ſtom to do all ſervile offices for the ſailors who land there. Now, it happened, that ſome of theſe miſerable wretches were employed in waſhing the linen and cloaths of thoſe men who had had the diſtemper: whereupon they were ſeized with it, and it raged among them with ſuch violence, that moſt of them periſhed under it. But as ſoon as fatal experience had convinced this ignorant people, that the diſeaſe was ſpread by contagion, it appeared, that they had natural ſagacity enough to defend themſelves. For they contrived to draw lines round the infected part of their country, which were ſo ſtrictly guarded, that, if any perſon attempted to break through them, in order to fly from the infection, he was immediately ſhot dead. Now, this fact ſeems the more remarkable, as it evinces, that neceſſity compelled a people of the moſt groſs ignorance and ſtupidity to take the ſame meaſure, which a chain of reaſoning led us formerly to propoſe, in order to ſtop the progreſs of the plague *; and which, ſome time after, had a happy effect, not only in checking, but even entirely extinguiſhing that dreadful calamity in France, where it broke forth, and threatened the reſt of Europe with deſtruction.

CHAP. II.

Of the nature and ſorts of the ſmall-pox.

HAving ſufficiently proved, in the preceding chapter, that the ſmall-pox is a diſeaſe of the peſtilential tribe; in order to a clearer knowledge of its

* Diſcourſe on the plague, part ii. chap. 2.

nature,

nature, I will briefly premiſe my notions of peſtilence.

All fevers which attack the whole body, may be conveniently ranged under the three general heads of ſimple, putrid, and peſtilential.

Simple fevers ariſe from a long-continued exceſs of velocity in the motion of the blood, and its conſequences, a diſturbance of its due mixture, and an interruption of the ſecretion of the humours in the ſeveral parts of the body.

Putrid fevers are cauſed, when, together with a concurrence of theſe circumſtances, a lentor enſues in the capillary blood-veſſels; and as this ſizy blood is gradually puſhed forward by the force of the circulation into the veins, it there becomes putrid, and impregnates the reſt of the maſs with a malignant quality, which is communicated both to the internal and external parts of the body.

Peſtilential fevers, in fine, I call all thoſe which are accompanied with ſome ſort of poiſon. Now, of whatever nature this happen to be, it not only infects and corrupts the blood, but more particularly ſeizes on the ſubtile nervous liquor, which is called the animal ſpirits. Hence it is, that theſe fevers act with greater rapidity and violence, and are much more fatal than the other ſorts. But this one circumſtance is common to all fevers, that nature endeavours to conquer the diſeaſe, by raiſing ſome ſtruggle or other, in order to throw forth from the body whatever is prejudicial to life.

Now, whereas the word *nature* is made uſe of by phyſicians in the cure of all diſeaſes, I will here, once for all, plainly declare my ſentiments of what

we

we ought to underſtand by that word. That there is ſomething within us, which perceives, thinks, and reaſons, is manifeſt beyond contradiction; and yet the nature of that ſomething cannot be fully and perfectly comprehended in this life. Wherefore I ſhall reſign the diſquiſition of this point to thoſe, who, while they know too little of, and care leſs for things falling under their ſenſes, take great pleaſure in inveſtigating thoſe things which human reaſon is incapable of conceiving. However, thus far the ſoundeſt philoſophers agree concerning it, that it is ſomewhat incorporeal. For, how can ſluggiſh matter, which is of itſelf void of all motion, be the ſource and firſt cauſe of thought, the moſt excellent of all motions? Wherefore, it is ſufficiently evident, that this firſt mover within us is a ſpirit of ſome kind or other, entirely different and ſeparable from terreſtrial matter, and yet moſt intimately united with our body.

Moreover, to me it ſeems probable, that this active principle is not of the ſame ſort in all; that the almighty Creator has endowed man with one ſort, and brutes with another; that the former ſo far partakes of a divine nature, as to be able to exiſt and think after its ſeparation from the body; but that the latter is of ſuch an inferiour order, as to periſh with the body. The former was by ſome of the ancients called *animus*, the latter *anima* *; and they believed, that they were both ingendered in our ſpe-

* Juv. ſat. xv. 148.
Mundi
Principio indulſit communis conditor illis
Tantum animam, nobis animum quoque.
Vide etiam Daviſii not. ad Ciceron. Tuſc. diſput. lib. i. cap. 10.

cies:

cies: but this I take to be an erroneous position. For as their *anima* suffices for the functions of life in brutes, so our *animus* stands not in need of such an assistant. Now, this matter, if I am not mistaken, stands thus: such is the composition of our fabric, that, when any thing pernicious has got footing within the body, the governing mind gives such an impulse to those instruments of motion, the animal spirits, as to raise those commotions in the blood and humours, which may relieve the whole frame from the danger in which it is involved. And this is done in so sudden a manner, that it should seem to be the effect of instinct, rather than voluntary motion; though it be effected in us at the command of the *animus*, and in brutes by the power of the *anima*. And indeed, those very motions which are commonly called natural and vital, as those of the heart, lungs, and intestines, which persevere through the whole course of life, even when the will cannot be concerned in them; as they have their beginning from the mind, so they are perpetually under its direction. I could easily bring many arguments in confirmation of these sentiments, but they would be superfluous in this place. Besides that I am happily anticipated by the learned and ingenious Dr Porterfield, fellow of the royal college of physicians at Edinburgh, who, in a curious dissertation published some years since *, has treated this subject with such perspicuity, that there can be no room left for doubt.

But from philosophy I return to medicine. Our sagacious Sydenham was so far of this opinion, as to

* Vid. medical essays published at Edinburgh, vol. i. essay xii. and vol. iv. essay xiv.

assert

aſſert, that a diſeaſe is nothing elſe but an effort of nature to throw off the morbific matter, for the health of the patient *. And Hippocrates, in his uſual manner, laconically expreſſed the ſame thing thus: "Nature is the curer of diſeaſes †." Now, this I have obſerved more particularly in peſtilential fevers, in which the violence of the diſtemper breaks forth on the ſkin in the form of puſtules, carbuncles, and buboes; all which are the very venom of the diſeaſe, as the common experiment of giving the ſmall-pox by inoculation plainly demonſtrates. Thus having made it appear, that the ſmall-pox is an invenomed fever, I come to explain its different ſorts; for as to its hiſtory, I refer to Dr Sydenham, who was the firſt that divided its whole courſe into certain ſtages, and gave the method of cure in each.

Moſt authors divide the ſmall-pox into the diſtinct and confluent ſorts, and eſtimate both ſorts by the ſize, number, and manner of eruption of the puſtules. But in the prognoſtic, they make ſo wide a difference between them, that they pronounce the former ſort to be almoſt void of all danger, but the latter always dreadful in its conſequences. Thus much indeed is moſt certain, that the confluent ſort are, generally ſpeaking, much worſe than the diſtinct, and that many more die of thoſe than of theſe. But yet it ſometimes happens, that a diſtinct ſort may prove more dangerous than the common confluent ſort. Moreover, there are many ſymptoms extremely dangerous, which are peculiar to the diſtinct kind, as I

* Obſervation. medic. circa morborum acutorum hiſtoriam, at the beginning. † Νόσων φύσις ἰητρός. Epidem. lib. vi.

ſhall ſhew anon. For the danger does not ſo much ariſe from the quantity of the purulent matter, as from other circumſtances, which ſhall be explained in their due place.

Wherefore, in my opinion, the ſmall-pox may more accurately, and agreeably to the nature of the diſeaſe, be divided into ſimple and malignant.

I call ſimple all that ſort, in which the eruption is attended with a ſlight fever of ſhort duration, the puſtules fill kindly, make good matter in a few days, and, in fine, fall off in dry ſcabs.

The malignant ſort is that, in which the eruption appears with a malignant fever, the puſtules hardly come to any tolerable degree of maturity, and either ſuppurate not at all, or if they do in ſome meaſure, as the fever is never off, it is with great trouble that they at length end in little cruſts.

That malignity appears in ſuch various forms, according to the different nature of the puſtules, that its characteriſtic ſigns have given various appellations to the ſmall-pox: whereof the chief differences, which have fallen under my obſervation, are theſe that follow. For the puſtules are either cryſtalline, warty, or bloody. I am well aware, that authors have run into a greater number of ſubdiviſions; but I look on the reſt to be either a combination of ſome or all of theſe, or only different degrees of the ſame kind: a thing which frequently happens in an irregular diſeaſe.

I call thoſe puſtules cryſtalline, which, inſtead of thick, well-digeſted matter, contain nothing but a thin, pale water, and are in ſome meaſure pellucid.

And

And this ſort is ſometimes obſerved, not only in the confluent, but alſo in the diſtinct ſmall-pox.

They are called warty, when the puſtules contain no fluid, but grow hard and prominent above the ſkin in the manner of warts. Theſe are peculiar to the diſtinct ſort.

The bloody puſtules are produced more ways than one. For I have ſeen caſes, where, at the very beginning of the diſeaſe, the puſtules were ſo many ſmall tubercles full of blackiſh blood, reſembling thoſe raiſed on the ſkin when pinched with a forceps. And theſe were followed by an intermixture of purple and livid ſpots, ſuch as phyſicians deſcribe in the true plague. But it more frequently happens, that puſtules coming out very thick, on the third or fourth day after, when they ought to fill, become livid, and a little bloody, with black ſpots ſpread over the whole body; which forebode death in a day or two, becauſe they are real gangrenes. It very often falls out at this time, that a thin blood flows not only out of the patient's mouth, noſe, and eyes, but alſo by every outlet of the body; but more eſpecially by the urinary paſſages, through which it likewiſe iſſues ſometimes on the firſt days of the diſtemper. Theſe are manifeſtly of the confluent-ſort.

To theſe Dr Freind * has added a fourth kind of ſmall-pox, which he calls *ſiliquoſe*, in which the puſtules reſemble little round, ſoft, hollow bladders, and contain no fluid. But this I place among the cryſtalline ſort; the only difference between them being, that in this caſe one part of the fluid, which had been thrown into the puſtules, flies off through

* Epiſt. de quibuſdam variolarum generibus.

the ſkin, and the other is abſorbed by the lymphatics back into the body.

It is always a difficult taſk, and ſometimes a needleſs one, to inveſtigate the true cauſes of things. But as the public may perhaps expect, that I ſhould account for the above-mentioned differences in this diſeaſe; I ſhall ſay, that the principal reaſons of theſe differences, which have occurred to me upon mature conſideration, are, the almoſt infinite variety of temperaments in various individuals; the ſeaſons of the year and their changes, and in fine, many accidents which befal the body, between the time of catching the infection and the appearance of the diſeaſe. For inoculation ſhews, that the ſmall-pox does not break forth before the eighth or ninth day from receiving the infection.

Poſſibly it may be thought ſtrange, that, in enumerating theſe cauſes, I have not mentioned a word of the nature of the infecting particles. But, beſides that the knowledge of this is not attainable by us, it ſeems to have no great influence on the production of this or that particular ſort of the diſtemper. For we frequently obſerve, in the ſame family, where one perſon catches it from another, that ſome have a favourable, and others a bad ſort.

But ſuch is the power of temperaments of body, that they deſcend to thoſe of the ſame blood by a ſort of hereditary right: whence ſome diſeaſes are found to be familiar and fatal to certain families.

As to the ſeaſons of the year, we find, by daily experience, that ſome of them are fitter to produce certain diſeaſes than others; that they are the cauſes of epidemic fevers; and that thoſe chiefly, in which

ſome

ſome fluid is to be thrown off by the ſkin, are the moſt remarkably liable to be affected by their changes.

But numberleſs are the things comprehended in the third article, to wit, all thoſe accidents which happen to the body from the time of taking the infection to the eruption of the puſtules. For the poiſon is far from lying quiet all this while, but is conſtantly and gradually exerting its malignity, by firſt corrupting the animal ſpirits, and then the whole maſs of blood and humours. Wherefore, if bodily exerciſe, diet, or the affections of the mind (which have great power in this caſe), ſhould happen to make any particular alteration in the fermenting fluids, they may eaſily occaſion various ſorts of puſtules, poſſibly in the manner I am going to explain.

The ſimple ſmall-pox are ſuppurations made, while the blood is not ſo far vitiated, but that the derivations of the humours into the proper parts may be effected tolerably well, and the natural functions are not entirely hurt. But in the malignant ſort the caſe is quite different. For the whole maſs of humours is corrupted more or leſs, according to the nature of the diſeaſe; and the blood is in ſuch confuſion, that the purulent matter cannot be thrown upon the ſkin. Now, in this caſe, ſometimes a thin fluid is thrown out, which, when watery, makes cryſtalline puſtules; when thick and viſcid, warty; and ſiliquoſe, in fine, when the fluid has been reſorbed by the lymphatics into the blood, and has left the puſtules quite empty. Beſides, the texture of the blood is too frequently broken to that degree, that it is obſtructed, and ſtagnates in the ſmall veſſels: whereupon, the

ſkin

ſkin is ſtrewed with black ſpots, which are ſo many real gangrenes, and hæmorrhages enſue through all the outlets of the body; whence this is called the bloody ſort. That theſe horrid ſymptoms are the effects of an acrid poiſon, appears plainly; becauſe the ſame happen to thoſe who have been bit by the hæmorrhois, a Lybian ſerpent, according to Lucan's beautiful deſcription:

A fierce hæmorrhois ſtruck both his fangs
Deep into Tullus; a brave valiant youth,
And fond admirer of great Cato's worth.
And as Corycian ſaffron, when 'tis ſqueez'd,
Pours forth its yellow juice through all the holes
Of the hard preſſing boards; ſo from the pores
Of all the parts flow'd ruddy venom'd gore.
His tears were bloody; nature's paſſages,
For their own humours, were all fill'd with blood.
His mouth, his noſe, chok'd up with filthy clots:
Red ſweats tranſpir'd from all the ſkin inflam'd.
His body ſeem'd one univerſal wound *.

But from theſe objects of terrour, it is time to paſs to thoſe which may afford comfort.

CHAP. III.

Of the methods of cure in the ſmall-pox.

IT is moſt evident, that all peſtilential diſeaſes are accompanied with the higheſt inflammation of the blood and humours, and therefore they all require emptying and cooling. I begin with the ſimple ſmall-

* Lib. ix. ver. 806.

pox,

pox, and ſhall afterwards deſcend to the treatment of the malignant ſort in its ſeveral varieties.

But in this place it ſeems proper to clear up two material points. The one regards the management of the ſick, and the other, the diet proper for him.

With reſpect to the firſt, ſerious attention ſhould be given both to the ſeaſon of the year, and to the ſtrength of the patient. For the ſame things that are done with ſafety in ſummer, may be attended with danger in winter; and young lads or robuſt men eaſily bear what might deſtroy infants, or weakly women. But let this be a general rule, to keep the patient in bed during the firſt days of the diſtemper, taking care to defend him from the inclemency of the winter by proper means, and to moderate the exceſſive heat in ſummer by cool air. But to chill and as it were to freeze up the ſick in winter, is not the part of a prudent phyſician, but that of a fool-hardy empiric, trying experiments at the expenſe of unhappy people's lives. Wherefore a mean is to be obſerved herein, by managing the patient in ſuch a manner, as neither to ſtifle him with heat or cloaths, nor check the eruption and perſpiration by cold. However, great care ought to be taken in general, to ſupply him with pure and cool air, which he may take in plentifully: becauſe a hot air cauſes difficulty of breathing, checks the ſecretion of urine, and increaſes the number of puſtules on the internal organs of the body; the conſequences whereof we may juſtly apprehend to be inflammations, and, towards the end of the diſeaſe, gangrenes.

With regard to diet, it ought to be very ſlender; moiſtening, and cooling; ſuch as oatmeal or barley-gruel,

gruel, &c. Nevertheleſs, as the food is to be adapted to the ſeveral ſtages of the diſeaſe, the beſt regimen in the beginning is that which will keep the body open, and promote urine. Theſe advantages are obtained by boiling preſerved fruits with their food; eſpecially figs, damaſcene plums, and tamarinds; and giving them ſubacid liquors for drink; as ſmall beer acidulated with orange or lemon juice; whey turned with apples boiled in the milk, or with wine; emulſions made with barley-water and almonds; Moſelle or Rheniſh wine plentifully diluted with water; or any other things of this kind.

When this ſort of diet did not keep the body open, the Arabian phyſicians added manna to it; but this they did ſparingly, and with caution. "For it is quite "neceſſary," ſays Avicen, "that the body be open in "the beginning *." Which is one of the moſt important advices that can be given in this diſeaſe, if to it be added, that urine muſt be made plentifully. For there is a wonderful correſpondence between the ſkin and the kidneys; whereby, whatever fluid is wont to be ſecreted by the cuticular glands, may with great eaſe be evacuated by the urinary paſſages. Wherefore it is very proper to draw off as much of the matter of the diſeaſe as can be done, by theſe paſſages, in order to prevent the overloading of the internal parts.

Now let us paſs on to medicines; and, in the firſt place, blood-letting is neceſſary. But as diſſenſions frequently ariſe on this ſubject, ſome rules are to be laid down concerning it.

It is agreed on all hands, that this remedy is not very ſuitable to the tendereſt age. But yet, as the

* De variolis & morbillis.

blood

blood of infants is generally too thick, and too much in quantity for the bulk of the body; and as they are oft-times seized with convulsions, upon the appearance of the disease, some evacuation ought to be made: which may be safely effected by leeches applied to the temples, or behind the ears. Likewise, if blood cannot be drawn from the arm, in most young subjects either of the jugulars may be opened without inconvenience.

That regard is to be had to the patient's strength of what age soever, is manifest to all. But the weakness is seldom so great, as not to bear some loss of blood, unless it be after some extraordinary evacuations. Nor is the pulse to be overmuch depended on in this case: for it often happens, that the thickness of the blood prevents the secretion of the usual quantity of animal spirits in the brain, and that the vital fluid is not propelled from the heart with due force: in which case, by removing the oppression, the patient's strength is observed even to increase with the bleeding.

But in what proportion blood is to be taken away, will be best determined by the vehemence of the disease. Many of our physicians imagine that they have done their duty, when they have ordered one bleeding, and are vastly cautious of opening a vein at all, after the first appearance of the pustules, for fear of checking the eruption. But this is certainly an ill-timed caution: for in youths and adults it is often necessary to draw blood two or three times, only with an intermission of two or three days between each time. And indeed blood-letting is so far from being an obstacle to the eruption

of the puſtules, if the patient be not too weak, that it forwards it conſiderably: and for the very ſame reaſon, that in large abſceſſes, when there is too great a fulneſs, and the heat too intenſe, the ſuppuration is brought on quicker and better by taking away ſome blood.

I have often obſerved, when in the beginning a vaſt number of ſmall puſtules foreboded a diſeaſe of the worſe kind, that the face of affairs was ſo remarkably changed upon one or two bleedings, that the puſtules increaſed in ſize, and diminiſhed in number, (the greatneſs of the diſeaſe thus giving way to the greatneſs of the remedy), by which means nature acquired ſufficient ſtrength to expel the noxious humour. For it is moſt certainly true, that nature labours at the expulſion of the poiſon in the moſt perfect manner, that is, endeavours to make the puſtules fill up as much as poſſible; and for that end ſhe requires every thing to be quiet within the body, and always abhors confuſion. And indeed, the reaſon why the confluent ſmall-pox is worſe than the diſtinct ſort, is not, becauſe the matter of the diſeaſe is more abundant in the former than in the latter, but becauſe it is not puſhed out in a proper manner. For upon a ſtrict examination we generally find, that the greater quantity is diſcharged in the diſtinct ſort.

Now, to conclude this head, ſuch is the benefit of large and reiterated bleeding, that it is obſerved to prevent thoſe evils which often attend the diſeaſe: as a delirium, convulſions, difficulty of breathing, and the like. For the diſſection of dead bodies ſhews, that the infection is not confined to the external parts of the body, but ſeizes on the internal parts alſo.

alſo. For I myſelf have ſeen ſubjects, in which the lungs, brain, liver, and inteſtines were thick beſet with puſtules. Nor have I the leaſt doubt, but that thoſe ſudden deaths which ſometimes happen towards the end of the diſeaſe, when there ſeemed to be no room left for fear, are occaſioned by the efflux of the purulent matter from the burſted puſtules on one or other of the nobler parts. Wherefore no fever is attended with more uncertain ſigns, on which to ground a ſure prognoſtic, than this of which we are treating. Upon the whole, there is no time of the diſeaſe, wherein it may not be neceſſary to draw blood; if the violence of the fever require it, and the patient appear able to bear it. For it is always better to try a doubtful remedy than none.

A frenzy, coming on the fourth day of the eruption, is juſtly eſteemed of very bad omen; inſomuch that Dr Freind ſays, that he never ſaw a patient recover who had had this ſymptom *. But I can poſitively declare, that I have had better fortune; having recovered many who had been ſeized with a delirium at that time, by drawing blood immediately, and then throwing in a clyſter.

After taking away as much blood as is requiſite, it is proper to purge the body; which may be done with ſafety enough, any time before the eruption of the puſtules. But the purge muſt be of the gentle kind; ſuch as the infuſion of ſena with manna, or manna alone, eſpecially for children. For no diſturbance is to be raiſed in the body. But firſt a vomit ſhould be given, if there happens to be any collec-

* Epiſt. de quibuſdam variolarum generibus.

tion of phlegm or bile in the ſtomach, or the ſtomach to be loaded with food unſeaſonably taken.

As ſoon as it is certain, that the eruption is near at hand, moſt phyſicians are of opinion, that it ought to be promoted, by all means. Yet we are to remember, that this is the proper work of nature; and therefore great care ſhould be taken, neither to increaſe the motion of the blood over-much, nor ſuffer it to grow languid.

It was a wiſe ſaying of Aſclepiades, that he made uſe of the fever for its own cure *: whereby he meant, that the fever is to be regulated in ſuch a manner, that itſelf may throw off whatever is noxious to the body. Wherefore the true intention in this caſe, is, to keep the inflammation of the blood within due bounds, and at the ſame time to aſſiſt the expulſion of the morbific matter through the ſkin. For both which purpoſes a medicine, which I have experienced to be uſeful, is a powder compoſed of two parts of the bezoardic powder, and one part of purified nitre; and ſometimes of equal parts of both. An adult may take half a drachm of this powder three or four times in a day, diminiſhing the quantity for children, in proportion to their age. And if the efferveſcence of the blood run very high, a proper quantity of ſpirit of vitriol may be added to the patient's drink. But if there be any reachings or retchings to vomit, they will be removed by draughts containing half an ounce of juice of lemons, with one ſcruple of ſalt of wormwood.

Now, concerning thoſe medicines which eaſe pain, and procure ſleep, in this ſevere diſeaſe, theſe are not

* Celſ. lib. iii. cap. iv.

to

to be uſed over-haſtily: for all anodynes in ſome meaſure obſtruct the ſeparation of the morbid humour from the blood, unleſs the pain happens to be exceſſive: and moreover, if the violence of the fever has raiſed a delirium, they generally make it worſe. Wherefore it is not proper to employ them, until the eruption of the puſtules be completed; but after that narcotics may be adminiſtered with ſafety. Thus it will be right to give the patient a doſe of the thebaic tincture, or diacodion, every evening, eſpecially if he be a youth or an adult perſon; for theſe medicines agree not ſo well with infants. And ſometimes, in caſes of very great inquietude, the doſe is to be repeated in the morning. For the ſuppuration of the matter ſtagnating in the puſtules, is forwarded by quiet and ſleep. But if, towards the end of the diſeaſe, the patient happens to be ſeized with a ſhortneſs of breath, or danger of choking from viſcid ſlime, theſe medicines are to be entirely prohibited. In the mean time, if the patient is coſtive, which is generally the caſe, and the fever continues, the body is to be opened with a clyſter every ſecond or third day.

It may be needleſs to obſerve, that if this method is proper in the diſtinct ſmall-pox, it will be found more neceſſary ſtill in the confluent, which is attended with greater fear and danger.

From the ſimple I now paſs to the malignant ſmall-pox, of which I have already eſtabliſhed three ſorts, to wit, the cryſtalline, the warty, and the bloody.

Now, this obſervation holds good in all kinds of the diſeaſe, that the more the puſtules tend to ſuppuration, the greater are the hopes of recovery; and therefore, when that does not go on according to our wiſhes,

wiſhes, all poſſible means are to be employed to throw the morbific humour on the ſkin; with which intention every thing is to be done in this caſe, which we have propoſed in treating of the ſimple ſort. But yet each ſpecies of the malignant ſort requires a peculiar conſideration.

Whereas, in the cryſtalline ſort, the water of the puſtules can never be brought to a laudable ſuppuration; it ought to be carried off by thoſe paſſages in the body, which are naturally adapted to the ſecretion of the thinner fluids. Now, I have ſaid above, that there is a great correſpondence between the ſkin and the kidneys. Therefore, while the thineſt parts of this water are made to tranſpire through the ſkin, the groſſer parts ought to be drawn off through the urinary paſſages, by diuretic medicines. Of this tribe there is nothing better than nitre, and that may be adminiſtered three or four times a-day, in ſuch quantities as may not offend the ſtomach, to wit, a ſcruple or half a drachm, diſſolved in ſmall wine, which is the only ſort that agrees with this diſeaſe till towards the end; when it may be proper to allow the patient a little Canary, (Dr Sydenham's favourite liquor), or any other ſoft and generous wine to ſupport his ſtrength. But while nitre is thus taken, it will be right to interpoſe thoſe medicines which cheriſh the heart, and promote the flux of the humour into the puſtules: ſuch as Raleigh's cordial, or the cordial confection; the bezoardic powder, ſometimes with a little ſaffron; and the plain ſpirit of hartſhorn. Beſides theſe, on the fifth or ſixth day of the eruption, bliſters are to be applied between the ſhoulders, and to the arms and legs: for which purpoſe, the bliſtering epithem is

moſt

moſt convenient, as its ſoft conſiſtence enables it to reach the ſkin between the puſtules, and ſtick to it. For by this diſcharge of the ſeroſities, the fever, which increaſes, when there is no farther derivation of humours to the ſkin, is ſeaſonably prevented.

I know indeed, that moſt of our phyſicians apply this remedy earlier, and even on the firſt days of the diſeaſe, in every malignant ſmall-pox: but there is juſt reaſon to fear, that the great commotion raiſed in the blood by the acrimony of the ſlies might be an obſtacle to the due propulſion of the humour into the beginning puſtules.

The warty ſmall-pox is more dangerous than the cryſtalline; becauſe the matter of the diſeaſe, being too thick, can neither ſuppurate, nor paſs off by urine. Wherefore it is neceſſary to uſe the utmoſt endeavours to take off the fever, and to provoke ſweat, in order to digeſt the morbid humour, by the cordial medicines aforementioned. And bliſters ought to be applied in this caſe likewiſe. But the Arabian phyſicians pronounced this ſort of the diſeaſe to be always fatal *.

Laſtly, that ſort which I have called the bloody ſmall-pox, requires peculiar attention. Now, in this ſort, if there is any room for phyſic, thoſe medicines bid faireſt for ſucceſs, which, by their ſtypticity, thicken the blood in ſome meaſure, and ſo check it, that it cannot break through even the ſmalleſt arteries. The beſt of this kind are the Peruvian bark, alum, and that ſpirit which is called oil of vitriol. Now, theſe are to be uſed alternately in this manner. A drachm of the bark may be given every ſixth hour;

* See Rhazes's treatiſe annexed, chap. viii.

and,

and, three hours after, a proper quantity of alum. It will be a very powerful medicine, if thus compounded. Melt three parts of alum on the fire, with one part of that inſpiſſated juice, which is improperly named *dragon's blood*: when the maſs is grown cold, reduce it to a powder; a ſcruple of which, made into a bolus with conſerve of red roſes, will be a proper doſe. The moſt convenient manner of giving the oil of vitriol, is in the tincture of roſes; five or ſix ſpoonfuls whereof may be taken ſeveral times in the day. And beſides, the patient's common drink may be acidulated with it; eſpecially if purple or black ſpots appear interſperſed among the puſtules. And this medicine will be of great ſervice, not only in the bloody, but in all the other ſorts likewiſe, accompanied with theſe ſpots. This one thing more I will add, that I have experienced the uſe of bliſters to be ſafe enough in this caſe, when a delirium requires their application. I have indeed ſeen ſome patients recover by this method, who had diſcharged large quantities of blood by the urinary canal at the time of the eruption of the puſtules; but it is worthy of notice, that, in all theſe, the diſeaſe terminated in ſome conſiderable evil. For they were tortured, either with boils breaking out in many parts of the body, or with glandular ſwellings under the ears or armpits, which were not eaſily brought to ſuppuration. I likewiſe remember the caſe of a young man, one of whoſe tonſils was deſtroyed by a gangrenous ulcer which was very troubleſome to cure. Thus upon the whole it is manifeſt, that it is extremely difficult to clear the maſs of blood of this poiſon; and that a perfect recovery is not to be procured without a ſuppuration, either

either in its due courſe of time, or in the laſt ſtage of the diſtemper.

But in every ſort of this diſeaſe, it is proper to open the body on the decline, that is, on the ninth or tenth day from the eruption; becauſe a putrid fever generally comes on about this time, while the puſtules are drying; or upon the ſubſidence of the ſwelling of the inflamed ſkin, where there is no ſuppuration; which fever cannot be taken off with equal ſafety by any other means. But gentle cathartics alone are to be employed in this caſe, ſuch as I have adviſed before the eruption of the puſtules.

This whole affair I formerly explained and illuſtrated with proper examples, in my letter to Dr Freind *; and that gentleman likewiſe abundantly confirmed it afterwards, by the authorities of ancient and modern phyſicians. So that whoſoever refuſes his aſſent to this practice, muſt reſolve not to ſee at noon-day. All fevers have their certain periods; and where the poiſonous matter has once infected the humours, the putrid fuel of the diſeaſe can hardly be thrown out of the body early enough. And indeed, when this rule is not obſerved, we daily ſee the diſtemper followed immediately by a hectic fever, attended with a cough, ſpitting of purulent matter, ſhortneſs of breath, and other ſymptoms of the lungs being affected.

But I muſt obſerve in this place, that, however beneficial purging may be at this time; yet, if the body happens to be too looſe, either from the natural ſtate of the inteſtines, or by frequent clyſters, this

* Vid. Freind commentar. vii. ad Hippocrat. de morbis popularibus. Et epiſt. de purgantibus in ſecunda variolarum febre adhibend.

remedy becomes leſs neceſſary, or at leaſt may be poſtponed for ſome days. For great regard is to be paid to the patient's ſtrength, which the length of the illneſs has more or leſs impaired.

Moreover, it is requiſite to be very circumſpect, whether there be any remains of the purulent matter lurking under the withered ſkin of the puſtules; for this is ſometimes ſo manifeſtly the caſe, that though the ſcabs appear dry and hard; yet, upon ſome of them breaking here and there, there iſſues forth very fœtid matter. In this circumſtance, the body is not to be purged, but rather to be ſupported by proper diet, until the matter is all come away; which I have ſeen continue running to the twenty-fourth day of the diſeaſe, and yet the patient recovered. I ſhall never forget the caſe of a certain young man of a very robuſt conſtitution, who had ſo dreadful a ſort of the confluent ſmall-pox, that when the puſtules ſhould have ripened, his whole face was become black and dry; and, in ſhort, thoroughly mortified. As the caſe ſeemed quite deſperate, I ordered inciſions to be made to the quick in many places, and fomentations of a decoction of emollient and warm plants, with the addition of camphorated ſpirit of wine, to be applied to the parts: whereupon there followed a diſcharge of matter from the inciſions of ſo offenſive a ſmell, that none of the attendants could bear to ſtay in the room; and having at the ſame time promoted this diſcharge by proper digeſtives, and duly purged him, he at length recovered. But his mangled face bore the laſting marks of the malignity of the diſtemper, and of the goodneſs of the cure.

In fine, it will be of uſe at this time to take away

ſome

ſome blood, if the heat be too great, and the patient have ſtrength enough left to bear it.

Whoſoever thoroughly conſiders all the circumſtances of this ſubject, which I have hitherto explained, muſt juſtly wonder how the learned Dr Boerhaave could be induced to hope, that ſome time or other a ſpecific antidote may be found againſt this contagious poiſon *; that is, by which it may be ſo thoroughly deſtroyed, that though it had been received into the body, it may not produce the diſeaſe. But the principles and elements of things are ſo certain, and ſo well eſtabliſhed by the permanent laws of nature, that whoſoever would endeavour to change them, would act like thoſe philoſophers by fire, (as they ſtyle themſelves), who labour hard to tranſmute the baſer metals into gold; and when continual diſappointments have convinced them of the vanity of their hopes, actually extract gold out of the purſes of the ignorant and credulous, by the fumes of their charcoal.

This one obſervation I muſt add, that there is no ſpecies of fever, which requires the body to be thoroughly cleared of the remains of the diſeaſe, more than this. Wherefore, upon the patient's recovery, blood is to be drawn, if his ſtrength will bear it; and cathartics are to be given ſeveral times at proper intervals. After which, the body is to be reſtored to its former ſtate by a courſe of milk, eſpecially that of aſſes, with ſuitable food, and the air and amuſements of the country.

I ſhall cloſe this long chapter with the account of a very malignant ſmall-pox in a youth of fifteen years

* Aphor. de cognoſcendis et curandis morbis, 1390. 1391, & 92.

of age, communicated to me by my ſon-in-law, the learned and ingenious Dr Wilmot; who, from the fifth day of the diſeaſe, attended the patient jointly with Dr Connel.

In the beginning of the fever preceding the eruption, the patient was directed to be let blood, and to take a vomit, and the next morning a gentle purge: the day following, the ſmall-pox flushed out. The puſtules were very numerous and ſmall all over the body, looking more like a rank meaſles than the ſmall-pox. As his fever ran very high, he was ordered draughts of Gaſcoign's powder with nitre, to be taken every ſix hours; and to drink plentifully of barley-water acidulated with ſpirit of vitriol.

On the fourth day of the eruption, as he was very delirious, in order to procure ſleep, a paregoric of ſix drachms of diacodion was given him, which did not produce the effect.

The fifth day there was not the leaſt ſwelling of the face; his pulſe was quick and full, his heat intenſe, and the delirium not abated. Wherefore he was ordered another bleeding; the nitroſe draughts were continued, with the addition of five grains of myrrh to each; as likewiſe barley-water with ſpirit of vitriol, and the paregoric as before.

The ſeventh, the appearance of the diſeaſe was ſtill the ſame, with the addition of an oppreſſion of his breath, and a very troubleſome dry cough. Diaſcordium was added to his nitroſe draughts, and he was ordered a ſolution of gum ammoniac, to be taken, a ſpoonful at a time, as occaſion required; and the paregoric continued.

The eighth, he complained much of a moſt acute pain

pain in his head; his ſhortneſs of breath and cough were increaſed, his pulſe low, and there were no ſigns of ſuppuration; nor the leaſt ſwelling in the face or hands: but the ſkin of his face looked like a piece of parchment. Bliſters were ordered to be laid on his arms and legs, and plaſters made of equal parts of the cephalic and bliſtering plaſters, to be wrapt round his feet: likewiſe draughts containing of mithridate half a drachm, and of volatile ſalt of amber half a ſcruple, to be taken every ſixth hour; and a gargle of pectoral decoction, and oxymel of ſquills.

The tenth, as every thing was grown worſe, beſides continuing the ſame medicines, bliſters were ordered below the elbows.

The eleventh, his pulſe being much lower, and the patient much weaker, a mixture with Raleigh's confection was ordered to be taken often by ſpoonfuls, and the other cardiacs continued.

On the twelfth, the pulſe being ſcarcely perceptible, and his breath oppreſſed to the laſt degree; when all hopes of ſucceſs were given up, a fit of coughing, in which he was almoſt ſuffocated, brought on a ſpitting of a limpid, fœtid humour, equal in quantity to a ſalivation raiſed by mercury. And this flux continued twelve days without any apparent abatement: from thence it gradually diminiſhed for four days, when it ſtopped entirely.

By the ſixteenth day, the diſeaſe, together with that diſcharge, had ſo far exhauſted him, that he was ſcarce able to turn in his bed: and yet his ſpirits were ſo much better, that he could take plentifully of liquid nouriſhment. Whereby gathering ſtrength, his fever had now the appearance of a hectic only;

for

for which he was ordered to loſe five ounces of blood, to take draughts of lemon-juice, and ſalt of wormwood, with a little ſperma ceti diſſolved in them, every four hours, and to drink aſſes milk every morning.

By this method, with the repetition of bleeding to five ounces two or three times, and now and then purging him gently with rhubarb; together with elixir of vitriol in Briſtol water, and the country-air, he in time happily recovered.

In this caſe we have a moſt remarkable inſtance of what I have already ſaid more than once, that is, how ſolicitous nature always is, at any rate to expel the poiſonous matter of this diſeaſe out of the body.

CHAP. IV.

Of accidents in the ſmall-pox.

MAny ſymptoms and circumſtances attend the ſmall-pox, which, as they neither commonly occur, nor ſeem to depend on the nature of the diſeaſe, either affright, or perplex the phyſician. Wherefore it may not be improper to make ſome remarks concerning them.

Sometimes the patient is ſeized with convulſions, juſt before the eruption. But this ſymptom is more terrifying than dangerous; and in children particularly, thoſe convulſions which frequently come on before the diſtemper appears, are generally rather a good, than a bad ſign. Now, in this caſe, though it may ſeem ſtrange, blood-letting is to be carefully avoided;

voided; but a bliſter is to be applied to the neck; and to the ſoles of the feet plaſters made of equal parts of the cephalic and bliſtering plaſters: not forgetting at the ſame time to give thoſe medicines inwardly, which experience has ſhewn to be antiſpaſmodic. Of theſe the chief are, wild valerian root, Ruſſian caſtor, and the ſpirits and volatile ſalts, chemically extracted from animals. For it has been frequently obſerved, that, upon drawing blood in this caſe, the diſeaſe ended fatally. I can aſſign no other reaſon for this event, but that thoſe involuntary motions are occaſioned by the patient's weakneſs; which is ſo increaſed by that evacuation, that nature becomes incapable of throwing out the morbid matter upon the ſkin. But the thing is otherwiſe in adults, who, if not too weak, ought to loſe a moderate quantity of blood, and then be put into the foregoing method.

The diſeaſe begins ſometimes in a different, and almoſt contrary manner. For the eruption appears without much fever or pain; for which reaſon there ſeems to be no danger. But that fond ſecurity is very frequently ill-grounded. For at the time when the puſtules ought to tend to maturity, as if nature were lazy, and not attending to her duty, there is no ſuppuration made: hence the fever increaſes, with inquietude of body, anxiety of mind, difficulty of breathing, and a delirium; which carry off the patient in a few days. In this ſtate, the fever ought rather to be raiſed than checked; and therefore warm medicines are to be directed, which promote ſuppuration, by increaſing the motion of the blood, and thinning the humours: ſuch are the Virginian ſnake-

ſnake-root, the contrayerva-root, ſaffron, aſa fœtida, myrrh, and the like. But above all, bliſters muſt be laid on all the limbs. Such is the neceſſity of ſome evacuation or other in this diſeaſe, that if the matter of the infection be over-abundant, as it happens in bad caſes, nature never fails endeavouring to throw off the load. Thus in adults a ſpitting comes on upon the firſt days of the eruption; whereas children, who ſeldom ſpit, have a looſeneſs almoſt through the whole diſeaſe. Both theſe evacuations are of great importance; and therefore, as the looſeneſs is not to be inconſiderately ſtopped in children; ſo in adults, if the ſpitting does not go on to our wiſhes, it ought to be promoted by medicines, which ſtimulate the glands of the mouth; eſpecially gargles made of a decoction of muſtard-ſeed and pepper, with the addition of oxymel. For in the confluent and malignant ſmall-pox, if this flux does not ariſe, and even continue to the end of the diſeaſe, it is a very bad ſign.

Sometimes a ſuppreſſion of urine makes the patient ſuffer great pain, receiving little or no relief from diuretics. In this caſe Dr Sydenham directed, that he ſhould be taken out of bed, and expoſed to the cool air: which generally has a good effect. But the moſt convenient method will be to open the body by a clyſter, eſpecially if, the puſtules now appearing, there be any fear of taking cold; and then to inſiſt a little on diuretic medicines; for which purpoſe Glauber's ſalt is particularly uſeful, as it is both laxative and diuretic.

Whenever a woman with child is ſeized with the ſmall-pox, the phyſician may juſtly dread the conſequences. For he has reaſon to fear a miſcarriage, which

which expoſes his patient to two ſorts of danger, the one from the new fever, which attends that accident; the other from the loſs of blood, which may bring her very low. And therefore the farther ſhe is advanced in her pregnancy, the greater riſk ſhe runs; becauſe the delivery of a large child cauſes a greater flooding than that of a ſmall one. I can however aſſert from my own knowledge, that a certain woman was delivered of a ſon at the full time, while ſhe was actually labouring under this diſeaſe; and yet both the mother and the child did well; but this is a caſe equally extraordinary and fortunate. But ſtill a good deal depends on the time of the diſeaſe, when the abortion happens: becauſe the weakneſs occaſioned thereby is the more dangerous, the more nearly it coincides with the time of the ripening of the puſtules. Wherefore, if the efflux be more than nature uſually requires, thoſe medicines are to be given, which I have propoſed in the bloody ſmall-pox.

Now, whereas theſe caſes fall out various ways, and phyſicians have been divided in opinion concerning ſome of them; it may not be improper to make ſome animadverſions on them ſeparately.

When a woman in the ſmall-pox ſuffers abortion, the child moſt commonly comes into the world with the diſtemper on it; but not always. The reaſon of this difference will eaſily be underſtood, by duly conſidering what I have already ſaid concerning infection *, and comparing it with what I ſhall hereafter ſay concerning the inoculation of the ſmall-pox †. Whereby it will plainly appear, that the ſeeds of the

* Chap. i. † Chap. v.

diſeaſe are ſubtile particles, exhaled from the puſtules come to maturity; which do not produce the effect, till eight or nine days after their entrance into a ſound body. Upon which account, when the child comes into the world, before matter is made in the puſtules on the mother, it has no viſible marks of the diſtemper. And thus it ſometimes happens, that the ſmall-pox, which the infant has contracted in the womb, breaks forth on the ſecond, third, or any other day before the eighth from the delivery, whether the child be come to its full time or not; as will appear by the following caſe, which lately fell under my own obſervation.

A lady of quality was, in the ſeventh month of her pregnancy, ſeized with ſo malignant a ſort of the confluent ſmall-pox, that there was no appearance of any one favourable ſymptom. For ſhe neither ſpit plentifully; nor did the ſwelling of the hands or feet come on, upon that of the face ſubſiding; nor, in fine, was ſhe aſſiſted by a flux of urine on the decline of the diſeaſe; but, on the contrary, her face was all covered with ſmall pimples, which made little or no matter. In this condition, ſhe was, on the eleventh day of the diſtemper, pretty eaſily delivered of a ſon, who brought no marks of the infection into the world; and ſhe died on the fourteenth day. But in the morning of the fourth day following, the infant was ſeized with convulſions, the forerunners of the eruption, which appeared the ſame day, and he died in the evening. In this caſe it is plain, that ſome ſuppuration having been made, as uſual, on the eleventh day, the diſtemper paſſed from the mother

to

to the child, which was not to break out till eight days after.

But in caſe there is no miſcarriage, the child will be free from the diſeaſe during his whole life; unleſs he happens to be born before the puſtules were come to maturity. For as ſomething naturally inherent in our conſtitution renders the body liable to the infection; ſo, when this debt is once paid to nature, we are ſecure ever after. But the infant in the womb ſometimes catches the diſtemper, without the mother being affected; as I ſhall prove by this remarkable inſtance, which I well remember. A certain woman, who had formerly had the ſmall-pox, and was now near her reckoning, attended her huſband in the diſtemper. She went her full time, and was delivered of a dead child. It may be needleſs to obſerve, that ſhe did not catch it on this occaſion: but the dead body of the infant was a horrid ſight, being all over covered with the puſtules; a manifeſt ſign that it died of the diſeaſe, before it was brought into the world. Wherefore, upon the whole, let none entertain the leaſt ſuſpicion, that the ſame perſon can poſſibly have this diſtemper twice. But the reaſon why the body is liable to the infection once, and no more, is to me as entirely unknown, as to the moſt ignorant of mankind. But this I will add, that an infant in the womb may have the good luck to go through the diſeaſe, and yet the marks be quite effaced before the birth *.

From what we have ſaid concerning abortions, it is eaſy to comprehend what judgment ought to be formed of the monthly evacuations coinciding with

* Vid. Mauriceau, ſur la groſſeſſe & l'accouchement des femmes, obſ. 576.

the ſmall-pox, a circumſtance at which people are apt to be alarmed. For this evacuation is of the ſame kind with the flooding which follows upon abortion: and whether it happens at the uſual time, or is brought on irregularly by the extraordinary effervescence of the blood; in both caſes, it rather affords relief than threatens danger. However, if in either caſe the diſcharge ſhould prove ſo great, as to weaken the patient over-much; it muſt be reſtrained by thoſe medicines which I have recommended in the bloody ſmall-pox, without neglecting to draw blood, if requiſite. But we know by experience, that women have ſometimes uterine diſcharges through the whole courſe of the diſeaſe, without loſs of ſtrength, or any other inconvenience.

The ſame judgment may be formed of hæmorrhages at the noſe, which frequently occur in the beginning of the diſtemper; for they are occaſioned by the rarefaction of the blood in the ſmall veſſels; and therefore, by diminiſhing the heat, are generally more ſerviceable than detrimental, unleſs they run to exceſs.

It happens ſometimes, though not often, that the variolous fever is accompanied with a ſingle or double tertian intermitting fever; in which caſe, the Peruvian bark, or, which is more convenient, its extract, is to be given at proper diſtances of time, till the paroxyſms ceaſe to return. Nor is there any reaſon to fear, that this medicine will hinder the maturation of the puſtules: on the contrary, as this new effervescence of the blood, and commotion of the humours, may eaſily prove an obſtacle to the ſuppuration; by checking theſe, all things proceed in their uſual courſe. But firſt, the body is to be opened by a clyſter. Now, the

the caſe is much the ſame here with reſpect to this febrifuge, as in mortifications, in which it is known to be of ſignal ſervice*: and it was from a reflection, that mortifications are always accompanied with a fever, that I have propoſed the ſame medicine in the bloody ſmall-pox, interſperſed with black ſpots, or, in other words, with ſmall gangrenes †.

Here it may not be improper to lay down one general rule, which is, that whatever acute diſeaſe comes upon the ſmall-pox, requires to be treated with its own peculiar medicines, and generally bears them very well.

By this time I hope I have thrown ſufficient light on the moſt material circumſtances of this part of my ſubject. But before I cloſe it, it ſeems well worthy of notice, that this diſeaſe is generally very mild, when it is contracted ſoon after ſome conſiderable evacuation, whether natural or artificial. Thus a woman in childbed has generally a kindly ſort of the ſmall-pox; if ſhe has recovered ſomewhat of ſtrength, by the time ſhe is ſeized with the diſtemper; and therefore reaps benefit from her late ſufferings. The ſame thing may be ſaid of ſuch as are newly recovered from ſome acute diſeaſe. And I have formerly ſeen many patients in the hoſpital, who, after ſalivation for the venereal diſeaſe, caught the ſmall-pox, while they were yet vaſtly emaciated; and all of them went through it with great ſafety; a manifeſt proof, that any evacuation, by withdrawing fuel from the fire, agrees particularly well with this diſeaſe. Laſtly, to all that I have hitherto ſaid, this one remark more is

* Vid. medical eſſays, Edinb. vol. v. part 1. artic. 10.
† Chap. iii.

proper

proper to be added. Though this be naturally a dreadful diſeaſe, yet it is ſometimes found to produce very good conſequences. For in conſtitutions, where the blood is vitiated, either from an original taint, or by the manner of living; and glandular tumours are occaſioned by the viſcidity of the lymph; the ſmall-pox, by purifying the juices, contributes to a better ſtate of health for the future.

CHAP. V.

Of the inoculation of the ſmall-pox.

THE cuſtom of inoculating, or transferring the ſmall-pox from an infected perſon to one that is ſound, has prevailed among us for ſome years. This matter has drawn our phyſicians into parties; ſome approving, and others diſapproving this new practice. I ſhall therefore freely interpoſe my opinion in the caſe.

Our nature is ſo formed, that although we are always inclined to avoid whatſoever may be hurtful; yet, when any evil is to be undergone, which can only be ſuffered once, this we are impatient to go through, even with a certain boldneſs; with this view, that the remainder of life may be paſſed without the uneaſineſs which ariſes from the continual apprehenſion of its coming upon us.

It having therefore been found by experience, that nobody was ſeized with the ſmall-pox a ſecond time, and that ſcarce one in a thouſand eſcaped having it once; men began to conſult how the diſeaſe might be communicated; it manifeſtly appearing to be contagious,

tagious, and it was obvious to conjecture, that the ſeeds of that contagion lay hidden in the puſtules.

But I have often wondered how ſuch a notion could come into the heads of people almoſt quite ignorant of what relates to phyſic. For, as far as I have been able to find out by inquiry, this was the invention of the Circaſſians, the women of which country are ſaid to excel in beauty; upon which account, it is very common, eſpecially among the poorer ſort, to ſell young girls for ſlaves to be carried away into the neighbouring parts. When therefore it was obſerved, that they who were ſeized with this diſtemper, were in leſs danger both of their beauty and their life, the younger they were; they contrived this way of infecting the body, that ſo the merchandiſe might bring the greater profit. Neither did the thing require the aſſiſtance of a phyſician or ſurgeon. It was ſufficient to make a ſmall wound in the ſkin, in any part of the body, and put into it a very little of the matter taken out of the ripe puſtules; and this even the women had learned to practiſe *: in like manner as our artiſts now, making a very ſlight inciſion in each arm, and putting upon it a ſmall thread of lint or cotton, imbibed with the corruption, very rarely fruſtrate the hopes of their deſirous patients.

In proceſs of time, not many years ago, this art began to be uſed at Conſtantinople and Smyrna; not by the Turks, who imagining all things in life to come to paſs by unavoidable fate, think it impious to oppoſe and reſiſt it; but among the Grecians, Armenians, and the people of other countries living there,

* See Philoſophical Tranſactions, No 339. and 347.

who

who gave the knowledge of it to our countrymen *.

But that I may omit nothing relating to this affair; a learned † author has given an account, that the practice of ſowing this diſeaſe, as they call it, has been known to the Chineſe above theſe hundred years; and that they do it in another manner, which is this. They take the ſkins of ſome of the dried puſtules, which are fallen from the body, and put them into a porcelain bottle, ſtopping the mouth of it very cloſe with wax. When they have a mind to infect any one, they make up three or four of theſe ſkins, putting between them one grain of muſk into a tent with cotton, which they put up the noſtrils.

It was indeed not difficult for ſuch ingenious people, when they ſaw thoſe who were converſant with the ſick, contract the ſame infection, to gueſs that the air, tainted with the foul breath of the diſeaſed perſon, did, when drawn in, corrupt one who was ſound; and therefore they might rationally argue, that the ſame contagious matter might be taken in at the noſtrils. Nor were they miſtaken in this point.

It is however certain, (whatſoever the author of this narration, more ſkilled in theological than in medical learning, may ſay to the contrary), that this Chineſe way of implanting the diſtemper is attended with much more danger than the Grecian one. For the morbid particles inſpired violently offend the brain, by

* See Maitland's account of inoculating the ſmall-pox, London, 1722; et Diſſertatio medica de Byzantina variolarum inciſione, auctore Le Duc. Lugd. Bat. 1722.

† Vid. Lettres edifiantes & curieuſes des miſſionaires, recueil xx. page 304.

reaſon

reaſon of its nearneſs to the nerves which perform the office of ſmelling; and we have in another place proved, that contagion is propagated, not by the blood, but by the nervous liquor *.

I myſelf have had an opportunity of making an experiment to this purpoſe. For, when in the year 1721, by order of his Sacred Majeſty, both for the ſake of his own family, and of his ſubjects, a trial was to be made upon ſeven condemned malefactors, whether or not the ſmall-pox could ſafely be communicated by inoculation; I eaſily obtained leave to make the Chineſe experiment in one of them. There was among thoſe who were choſen out to undergo the operation, a young girl of eighteen years of age: I put into her noſtrils a tent, wetted with matter taken out of ripe puſtules. The event anſwered: for ſhe, in like manner with the others, who were infected by inciſions made in the ſkin, fell ſick, and recovered; but ſuffered much more than they did, being, immediately after the poiſon was received into the noſe, miſerably tormented with ſharp pains in her head, and a fever, which never left her till the eruption of the puſtules.

Since that time, this practice has been followed, without much fear, and indeed (as it uſually happens in new experiments) ſometimes with a degree of raſhneſs; as promiſing a milder kind of ſmall-pox, than when taken in the natural way. For, by † the accounts

* Introduction to the mechanical account of poiſons.

† See Dr Jurin's letter to Dr Cotesworth, containing a compariſon between the mortality of the natural ſmall-pox, and that by inoculation; and His account of the ſucceſs of inoculation in the years 1724, 25, and 26.

collected by thoſe who have inquired into the affair, it is plain, that ſcarce one in a hundred dies by the inoculated ſmall-pox; whereas many more in proportion are deſtroyed by the ordinary diſeaſe.

A remarkable inſtance of this difference, and with what ſecurity this tranſplanting the diſtemper may be made, is given in the following relation, communicated to me by a gentleman of great credit. He was a merchant at St Chriſtopher's, in the Weſt Indies, and in the making of ſugar (which is the trade of that place) employed a great number of ſlaves. In one year, when the ſmall-pox raged with more than ordinary violence in the neighbouring iſlands, with his own hands, he inoculated three hundred of them, from five to thirty years of age, with ſuch ſucceſs, that not one of them died, though moſt of them were negroes. And whereas all the Americans ſuffer this diſtemper in a moſt terrible manner; yet experience ſhews, that it is much more dangerous, when it attacks the natives of Africa.

Things being thus, it may be proper to conſider, whether any reaſons can be alleged to the contrary. And, in the firſt place, there are ſome who inſiſt upon it, that the eruptions produced by inoculation are not the genuine ſmall-pox, and conſequently that they cannot ſecure any one from having the diſeaſe hereafter. Moreover, they take pains to bring teſtimonies of patients, who, after having undergone the artificial diſtemper, have nevertheleſs been afterwards ſeized with the true one.

Now, I own, I cannot underſtand how contagion, that is, the very ſeed of the diſeaſe, ſhould produce, not its own proper diſtemper, but another of a quite different

different kind. Neither certainly does it matter, by which way the infection is received, provided it brings forth manifeſt marks of the diſeaſe. And as to thoſe, who, after having been inoculated with ſucceſs, are, notwithſtanding this, ſaid to have ſuffered the ſmall-pox; I muſt proteſt, that, after the moſt diligent inquiry, I have not been able to find out one convincing proof of this kind. I very well know, that a ſtory is ſpread abroad, particularly by a late author, of a boy, upon whom, about three years after he had contracted the diſeaſe by inoculation, it broke out again. But I am well aſſured, that this narration is of doubtful credit; and that there were ſome of the family, who affirmed, that no ſmall-pox appeared upon the inoculation; that the parents (as we eaſily believe what we wiſh) deceived themſelves, and that the by-ſtanders did not care to take away from them this pleaſing miſtake.

But to ſpeak plainly, if ſuch a thing happened once, why do we not ſee it come to paſs oftener? Or what can a ſingle example, ſuppoſing it to be true and certain, avail, when innumerable experiments have produced nothing like it? However, ſome men are infected with an incurable itch of writing, and take great pleaſure in contradicting others, to whom they bear envy. Let us therefore give them leave to applaud themſelves, and enjoy their own vain-glory.

But they will ſtill go on to terrify us, by ſaying, that there is danger leſt, together with the ſmall-pox, ſome other infectious diſeaſe, inherent in the blood and humours of the ſick perſon, ſhould be tranſmitted into the ſound body; all contagion being very

ſubtile, and wonderfully active. And it is indeed not improbable, that ſome other diſtemper, beſides thoſe which are cutaneous, may, by ſuch a way as this, get admittance into the ſkin; and ſuch perhaps are ſcrophulous ſwellings, and the venereal diſeaſe. Yet I can hardly believe, that it ever happens, that the ſeed of one diſtemper ſhould bring along with it mixed, the procreative matter of another, of a nature quite different from it. However it be, it would be madneſs in a phyſician, without any choice, to take the morbid matter for this purpoſe, out of ſick bodies, without diſtinction. The moſt proper ſubjects are infants or children, found in all other reſpects, as far as can be judged, and born of healthy parents. Beſides, it is, in my opinion, more material, into what kind of a body the venom be infuſed, than out of what it be taken. And this I the rather mention, becauſe I have more than once known raſh and unwary ſurgeons to implant the diſeaſe into bodies weak, and of an ill habit, with a fatal event. Laſtly, it is of very great conſequence to take care not to throw a new infection into one already infected: for I have obſerved this to prove mortal; nature being oppreſſed and ſinking under a double diſeaſe, when perhaps ſhe might have got the better of either of them ſingle.

I have often conſidered for what reaſons it is, that the inoculated is ſafer than the natural ſmall-pox; and the following ſeem to be the chief. Firſt, the venom is communicated to a young, healthy, and, for the age, ſtrong body. In the next place, the violence of the fever, which follows, is prevented, if there be occaſion, by bleeding, and gentle purging. And laſtly,

laſtly, through the whole time that the contagious matter is exerting its malignity upon the humours (which is generally eight or nine days), quietneſs, moderation in diet, and every thing elſe is ſtrictly obſerved: whereas, many incur the natural diſtemper on a ſudden, when the blood is heated with wine and exerciſe; by which means, all the ſymptoms muſt neceſſarily prove more ſevere and dangerous. Some have alſo been of opinion, that the diſcharge out of the wound made to introduce the purulent matter, and likewiſe from the ſmall pimples which break out round it, may contribute ſomething to the ſafety of the patient. But the ſmall quantity which runs out this way, cannot, I think, avail much. Two bliſters laid, one to an arm, the other to a leg, will certainly do much more; eſpecially if they be kept running throughout the whole courſe of the diſeaſe. And I make no queſtion, but this practice would be of very great ſervice.

It is proper to mention, that this artificial diſeaſe is uſually ſo mild, that it ſcarce requires any help from medicines. But where it happens otherwiſe, as it ſometimes does, the ſame will be neceſſary, which have been directed in the ſeveral kinds of the natural ſmall-pox.

To conclude; it ought not to be omitted, that boils, and ſwellings under the ears, and in the armpits, ariſe more frequently after the diſtemper procured by art, than after that which comes of its own accord; for this reaſon, as I ſuppoſe, that the venomous matter is puſhed forward with leſs force, which diſadvantage nature makes amends for this way.

Therefore, all poſſible means are to be uſed to

ripen

ripen ſuch tumours, of whatever kind they are: if this cannot be done, they muſt be opened by inciſion; and when all the matter is drawn out, the body muſt be purged by proper medicines, which are to be oftener repeated in this, than in the natural diſeaſe.

CHAP. VI.

Of the meaſles.

THE meaſles have a great affinity with the ſmall-pox; being originally bred in the ſame country, propagated in the ſame manner, by infection, into diſtant parts of the world, and never ſeizing any perſon more than once.

The hiſtory of this diſeaſe, as it generally appears among us, Dr Sydenham has deſcribed with his uſual accuracy, calling it a fever, which in its nature and method of cure agrees very much with the ſmall-pox; that is, accompanied with a great inflammation, and in which puſtules of a particular kind are thrown out upon the ſkin.

Now, this inflammation does not only affect the ſurface of the body, but the inner parts alſo, and particularly the lungs: hence follows a cough, with a difficulty of breathing. And although the diſtemper in its nature be leſs dangerous than the ſmall-pox, and continues a ſhorter time; for it uſually is ended in ſix or ſeven days, or, at the fartheſt, in eight, very thin, and light ſcales, like fine flower, falling off from the ſkin at that time; yet it ſeizes with more violent heat,

heat, and greater anxiety than the other does. Therefore Rhazes obſerved, that the inflammation of the whole body, the inquietude, and anxiety of mind, are much more terrible in the meaſles, than in the ſmall-pox *.

I have therefore often wondered, why that ſagacious and experienced phyſician, whom I have ſo often mentioned with praiſe, did not preſcribe bleeding in the very beginning of the diſeaſe; but neglected this material part of the cure ſo far, that he only ordered it at the end, when a hot regimen, and too warm medicines, had brought upon the patient a cough and ſhortneſs of breath. Eſpecially ſince he himſelf takes notice, that the looſeneſs, which often follows this fever, and which, he ſays, proceeds from hot vapours from the inflamed blood falling upon the bowels, is only to be cured by blood-letting †. But the great man deſerves pardon upon this account, that, in thoſe times, phyſicians never attempted to take away blood in thoſe fevers which were attended with any eruptions, particularly in children, who are the moſt liable to this kind of illneſs. Their reaſon was, leſt that emptying of the veſſels ſhould hinder the coming out of what was to be diſcharged by the ſkin. But daily experience ſhews, that this fear is vain, and that the event is quite contrary to what they imagined.

To come therefore to the cure: As this peſtilential diſeaſe is of kin to the ſmall-pox, it requires a management not very different from the ſame, which we have recommended in that diſtemper. Blood muſt be taken away in the beginning, according to the age

* See his book, at the end of this chap. i.

† De morbillis, cap. v. p. 207. edit. 1685.

and

him what method I followed in this diſeaſe. I aſked him, whether or not he uſed to take away blood? He anſwering, No, becauſe Sydenham very ſeldom did it; I adviſed him to open a vein in the beginning of the diſtemper, or, if he was called in later, as ſoon however as he poſſibly could: for, ſaid I, this diſeaſe always brings with it a peripneumony, which he very well knew ever required bleeding. Not long after, he met me again, returning me hearty thanks for my counſel, aſſuring me, that he had not loſt one patient whom he had treated in this manner. Since that time, this practice grew ſo common, that it is now followed even by our apothecaries.

In the laſt place, it is proper to take notice, that, as was obſerved concerning the ſmall-pox *, that the diſeaſe is more or leſs rife, according as the ſeaſon of the year and ſtate of the air conſpire with the infection; ſo the like happens in the meaſles. And Dr Morton relates, that, in the year 1672, this diſtemper was ſo terrible, that in London there died of it three hundred every week †.

But I have at laſt finiſhed this little work; which though it may perhaps, to contentious and malevolent perſons, give matter for calumny and finding fault; yet will, I hope, prove beneficial to mankind, eſpecially to our own countrymen. This is all I deſire; for the conſciouſneſs of having done right is beyond all praiſe, carrying with it its own reward: and this he always enjoys, who conſults the public good, and by his actions ſhews, that he thinks he is

Not for himſelf, but for the whole world born ‡.

* Chap. ii.

† Append. ad exer. de morbis acutis, pag. 427.

‡ Non ſibi, ſed toti genitum ſe credere mundo. Lucan. l. ii. ver. 383.

RHAZES's

RHAZES'S TREATISE on the SMALL-POX and MEASLES.

PREFACE.

In the name of God, merciful and gracious.

ABU-BEKER MOHAMMED, the ſon of Zacharias, ſaith thus:

On a certain night, at a meeting in the houſe of a nobleman, of great goodneſs and virtue, and very fond of the explanation of uſeful ſciences, that they might be made plain and intelligible for the public benefit; the converſation having turned on the ſmall-pox, I then ſpoke what came into my mind on that ſubject. Which when that great man (whom may God long preſerve for the good of mankind) had heard, he deſired, that I would write a diſcourſe on that diſeaſe with ſufficient aptneſs, ſolidity, and clearneſs; becauſe there had never yet been publiſhed, either by the ancients or moderns, a ſatisfactory account of it.

I therefore compoſed this treatiſe, hoping to receive my reward from the almighty and glorious God, as the effect of his good-will.

Now, this is the ſum of its contents, and the heads of the chapters.

CHAP. I.

Of the cauſes of the ſmall-pox; and how it comes to paſs, that no mortal, except by chance here and there one, eſcapes free from this diſeaſe.

CHAP. II.

What bodies are moſt diſpoſed to the ſmall-pox; alſo of the ſeaſons of the year, in which they moſt frequently happen.

CHAP. III.

Of the prognoſtic ſigns of the eruption of the ſmall-pox and meaſles.

CHAP. IV.

Of the regimen or cure of the ſmall pox, in general.

CHAP. V.

Of preſervation from the ſmall-pox before the ſigns of them appear; and the way to hinder the multiplying of them after the ſigns have appeared.

CHAP. VI.

Of thoſe things which haſten the eruption of the ſmall-pox: alſo how nature is to be aſſiſted therein.

CHAP. VII.

Of taking care of the eyes, throat, ears, and joints,

as

as ſoon as the ſigns of the ſmall-pox have appeared.

CHAP. VIII.

Of ripening the puſtules.

CHAP. IX.

Of drying the puſtules.

CHAP. X.

Of taking away the dry ſcabs of the ſmall-pox, and the eſchars from the eyes, and the reſt of the body.

CHAP. XI.

Of deſtroying the marks of the ſmall-pox.

CHAP. XII.

Of the food and diet in the ſmall-pox.

CHAP. XIII.

Of managing the diſcharges of the belly, in the ſmall-pox.

CHAP. XIV.

Of the curable and incurable ſmall-pox and meaſles.

RHAZES's TREATISE on the SMALL-POX and MEASLES.

CHAP. I.

Of the cauſes of the ſmall-pox; and how it comes to paſs, that no mortal, except by chance here and there one, eſcapes from this diſeaſe: alſo a brief account of what Galen has mentioned concerning it.

AS to thoſe phyſicians, who affirm, that the moſt excellent Galen has made no mention of the ſmall-pox, and therefore that he did not know this diſtemper; ſurely they have either never read his works at all, or only very curſorily; nay, moſt of them do not know, whether what he plainly ſays of it, is to be underſtood of that diſeaſe. For Galen, in a certain treatiſe, ſays, this ** does good this and that way, and alſo againſt the ſmall-pox. And in the beginning of the fourteenth book, *Of pulſes*, that the blood is putrefied in an extraordinary degree, and that the inflammation runs ſo high, that it burns the ſkin; ſo that the ſmall-pox, and peſtilent carbuncle are bred in it, and quite conſume it.

And in the ninth treatiſe of the book *Of the uſe of the parts*, he obſerves, that the ſuperfluous parts of aliments, which are not turned into blood, and remain in the members, putrefy, and in time increaſing do ferment; whence, at laſt, are generated the peſtilential carbuncle, the ſmall-pox, and confluent inflammations.

Laſtly, in the fourth part of his commentary upon

on the Timæus of Plato, he ſays, that the ancients gave the name φλεγμονὴ to every thing which produces redneſs, as the carbuncle, and ſmall-pox; and that theſe diſeaſes are bred in thoſe in whom bile abounds.

But as for thoſe who allege, that he has propoſed no remedy or cure, nor explained the nature of this diſtemper, they indeed ſay what is true: for he mentions no more than what we have cited. But God knows, whether he might not have done it in ſome other books, which have not yet appeared in Arabic.

As for my own part, I have with great diligence inquired of thoſe who underſtand both the Syriac and Greek language, and deſired them to inform me concerning this matter: but not one of them could tell me more than what I have ſet down. But this indeed I very much wonder at, and why he paſſed over this diſtemper in ſilence; eſpecially ſince it was frequent in his time, and therefore there was great reaſon for his preſcribing remedies againſt it, as he was ſo diligent in finding out the cauſes and cures of diſeaſes.

The moderns have, it is true, propoſed ſome medicines for the cure of the ſmall-pox, but not diſtinctly and clearly enough; neither has any one of them explained the cauſe of it, and why, except here and there one, nobody eſcapes it; nor ſhewed the methods of cure in a right order. Upon which account, I hope that the good man who encouraged me to undertake this work, will have his recompenſe; and that my reward will be doubled, when I ſhall have deſcribed whatever is neceſſary to the cure of this diſeaſe in due method, aſſigning to every thing its proper place, by the help of God.

Wherefore

Wherefore let us begin to recite the efficient cauſe of this diſtemper; and why it happens, that ſcarcely any one mortal eſcapes it. And then we will purſue ſeparately, in the ſubſequent chapters, the other things which relate to it; and, with God's aſſiſtance, ſhall ſay on each head whatever is neceſſary for its cure.

I ſay then *, that the body of man, from the time of his nativity, till he arrives at old age, continually tends to drineſs; and that therefore the blood of infants and children, and, in proportion, the blood of young men, abounds much more with humidity, than the blood of old men, and is alſo hotter. And this indeed Galen teaches us, in his commentaries upon the aphoriſms, where he ſays, the heat of children is indeed greater in quantity, than the heat of young men; but the heat of young men is more violent in quality. This alſo is evident from the force of their natural actions, as the digeſtion of their food, and accretion in children.

Therefore, the blood of children may be compared to new wine, in which the fermentation leading to ripeneſs is not yet begun; and the blood of young men to the ſame, fermenting and emitting ſteams, till it is quiet and ripe. And, laſtly, the blood of old men is like to wine, whoſe ſtrength is gone, ſo that it becomes vapid, and begins to grow ſour.

Now, the ſmall-pox ariſes, when the blood putrefies and ferments, and the fermenting particles are thrown out of it; the blood of children, like to new wine, being changed to that of young men,

* Here begins the tranſlation of the anonymous Greek interpreter.

which

which is as wine perfectly ripened. And this fermentation and ebullition is the diſeaſe.

And this is the reaſon why children, eſpecially males, rarely eſcape being ſeized with it. For, without doubt, as the wine naturally ferments till it comes to perfection; ſo the blood undergoes the ſame alteration, in paſſing from its firſt to its ſecond ſtate. And there ſeldom happens a temperament in an infant or child, in which ſuch a change can be made in a ſmall time, and without manifeſt ſigns of it: as may be judged from their diet, which in infants is milk; and in children, not milky, but their food is ſtronger, in proportion, than that of other ages, and more compounded. To which it may be added, that in theſe there is, after food, a greater motion of the humours. For theſe reaſons, very few children go into life without this diſtemper. Beſides this, great alterations are made here, by different temperaments, manners of life, and habits; as alſo by the conſtitution of the ambient air, and ſtate of the blood, both as to quantity and quality: for in ſome this flows quicker, in others ſlower; in ſome it abounds, in others it is deficient; in ſome it is very bad, in others in a better condition.

As to young men, whereas the change in their blood is already made, its maturation finiſhed, and the particles of moiſture, which ſhould cauſe putrefaction, are now exhaled; hence it follows, that this diſeaſe cannot be generated in them, at leaſt but very ſeldom, that is, in ſuch whoſe blood ſtill abounds with too much humidity, or is very corrupt, with a violent inflammation; or who, perhaps, when they were children, had been attacked with the chicken-

pox, when their blood had not yet paſſed from the firſt ſtate to the ſecond; or laſtly, who have a moderate heat, that is, without much moiſture; and when they had the chicken-pox, were of a dry temperament, and lean.

In an advanced age, the diſtemper will ſcarcely appear, unleſs perhaps in putrid, malignant, and peſtilential conſtitutions of the air, in which this diſeaſe chiefly rages. For ſuch an air diſpoſes bodies very much to heat and moiſture; and an inflamed air promotes eruptions, by blowing up the ſpirit in the ventricles of the heart, and communicating to it the like diſpoſition, which, by the force of the heart, is ſent into the blood, which is in the arteries; and brings it into the ſame ſtate of corruption.

Thus we have ſufficiently, though ſuccinctly, treated of the cauſes of the ſmall-pox. We ſhall now proceed to ſhew, what bodies are moſt diſpoſed to this diſeaſe and the meaſles.

CHAP. II.

Of bodies diſpoſed to the ſmall-pox.

BOdies inclined to this diſeaſe are generally ſuch as are moiſt, pale, and fleſhy; the well-coloured alſo, eſpecially, if they are ruddy and tending to brown, are diſpoſed to it, if they are loaded with fleſh. So are likewiſe thoſe who are frequently liable to acute and continual fevers, to running of the eyes, red pimples, and boils, proceeding from the eating of ſweet things; as dates, honey, figs, grapes, and all thoſe ſweets in which there is a groſs humour;

mour; particularly, thick gruels, food made of unground wheat, with honey and water, or a great quantity of wine and milk.

Lean, bilious, hot, and dry bodies are more inclinable to the meaſles, than to the ſmall-pox. But if they happen to be taken with the ſmall-pox, the puſtules are either few, diſtinct, and favourable; or, on the contrary, very bad, irregular, deceitful, dry, with putrefaction, and no maturation.

Laſtly, thin, and dry bodies, of a cold temperament, are neither ſubject to the ſmall-pox, nor to the meaſles. And if they happen to catch the ſmall-pox, they have but few, in a moderate way, and without danger, with a very ſlight fever; becauſe ſuch conſtitutions extinguiſh the diſeaſe in its very beginning.

The ſeaſons of the year in which the ſmall-pox are moſt frequent, are various; they rage moſt at the latter end of the autumn, and the beginning of the ſpring: and when in the ſummer there are great and frequent rains, with continual ſouth-winds; and laſtly, when the winter is warm, and the winds ſoutherly.

When the ſummer is exceſſively hot and dry, and ſucceeded by a hot autumn, in which rains come on very late; then the meaſles quickly ſeize thoſe who are diſpoſed to them, that is, thoſe who are lean, hot, and of bilious conſtitutions.

But all theſe things admit of great differences, by reaſon of the diverſity of countries and places, and occult diſpoſitions in the air, which bring on thoſe diſtempers, and render bodies ſubject to them. And therefore, at ſuch times great diligence is to be uſed

in the preſervation from them; as we ſhall ſhew in the ſequel.

CHAP. III.

Of the prognoſtic ſigns of the eruption of the ſmall-pox and meaſles.

THE eruption of the ſmall-pox is preceded by a continual fever, a pain in the back, itching in the noſe, and terrours in ſleep. Theſe are the proper ſigns of the approaching ſmall-pox, eſpecially the pain in the back, with a fever; and alſo a prickling, which the patient feels all over his body; together with a fulneſs and redneſs of the face, which at times goes and comes: a redneſs of the eyes, a heavineſs of the whole body; frequent yawnings, a pain in the throat and breaſt, with a difficulty in breathing, and ſtraitneſs in the gullet, then a drineſs of the mouth, thick ſpittle, a hoarſeneſs of the voice; head-ach, anxiety of mind, inquietude; ſick qualms and heavineſs of heart: with this difference, that anxiety of mind, ſick qualms, and heavineſs of heart, oppreſs more in the meaſles than in the ſmall-pox, unleſs the ſmall-pox be of a bad ſort; for the meaſles are from a very bilious blood. And, on the other hand, the pain in the back, the heat and inflammation of the whole body, eſpecially in the throat, with a ſhining redneſs, are more proper to the ſmall-pox than to the meaſles.

Wherefore, upon the appearance of theſe ſigns, or ſome of the worſt of them, you may be aſſured, that one or the other of theſe diſeaſes is nigh at hand.

As

As to the ſafer kind of the ſmall-pox; in theſe, the quantity of blood is greater than its bad quality; and hence ariſes the pain of the back; the greater blood-veſſels, which are ſituated near the vertebræ of the back, being diſtended with too great a quantity of blood.

CHAP. IV.

Of the regimen, or cure of the ſmall-pox in general.

THE firſt article ſhall be of the preſervation to be uſed, before the ſigns of the ſmall-pox appear; and after they have appeared, how the diſeaſe may be leſſened.

The ſecond, concerning the eruption.

The third, the care to be taken of the eyes, ears, noſe, throat, and joints.

The fourth, of the ripening of the puſtules.

The fifth, of their drying.

The ſixth, how the ſcales and cruſts are to be cleared from the eyes, and the reſt of the body.

The ſeventh, of deſtroying the marks.

The eighth, of the diet in the ſmall-pox.

The ninth, of regulating the diſcharge by the inteſtines.

The tenth, of curable and incurable ſmall-pox and meaſles.

Of each of theſe I ſhall, God willing, briefly, but ſufficiently diſcourſe.

CHAP. V.

Of preſervation from, and leſſening the diſeaſe.

BLood ought to be taken away from children and young men, if they have never had the ſmall-pox, or have only had what is called the chicken-pox, (eſpecially at ſuch ſeaſons as we have above deſcribed), before they are ſeized with a fever, and the ſigns of the diſeaſe appear. A vein may be opened in thoſe who are fourteen years old; to thoſe who are younger, cupping glaſſes muſt be applied, and their lodgings ſhould be kept cool.

Let their diet be yellow lentils, tarts made of unripe grapes, minced fleſh-meat, dreſſed with vinegar and honey, or with the acid ſyrup; to which raiſins, a few figs, and chiches are ſometimes added: alſo kid-broth, veal-jellies, and boiled woodcocks and hens. But theſe muſt be mixed with the juice of unripe grapes.

Their drink ſhould be water cooled with ſnow, or clear ſpring-water cold; with which their chamber may alſo be ſprinkled.

Let them frequently eat acid pomegranates, and the inſpiſſated juices of acid and aſtringent fruits, as pomegranates, currants *, and the like.

Where the conſtitution is hot, and there is a great inflammation; barley-water, with a fourth part of acid pomegranate juice, may be drank in the morning.

* The Arabic word is *Ribas*, which alſo ſignifies a ſort of lapathum acetoſum, or ſorrel, of which the red and acid juice boiled to two thirds, is called *Rob de Ribes*. See Golii lexic.

But

But if the heat be leſs, a ptiſan of barley, with ſugar, is proper; and vinegar, lentils, pomegranates, and the juice of unripe grapes, may be added to the food; for all theſe thicken and cool the blood, and make the diſtemper more mild.

This regimen is of great ſervice in all times of peſtilence; for it diminiſhes the malignity of peſtilential ulcers and boils; and prevents quinſeys, pleuriſies, and all diſtempers ariſing from bile and blood.

The patient may go into cold water, and ſwim in it about noon. He muſt abſtain from new milk, wine, dates, honey, and, in general, from ſweet things, and meats made by a mixture of fleſh, onions, oil, butter, and cheeſe; from mutton, beef, ſhell-fiſh, high-ſeaſoned things, and hot ſeeds. Inſtead of theſe, in times of contagion, he may eat young birds: and if the temperament be hot and moiſt, liable to putrefaction, or hot and dry, and apt to be inflamed; he muſt eat as follows; that is, in the hot and dry conſtitution, cooling and moiſt garden-herbs, purſlain, mallows, beet, gourds, cucumbers, ſorrel, and ſmall pompions.

As to ſweet melons, they are forbidden; and if any one by chance eats of them, he muſt preſently drink a ſpoonful of the juice of ſome of the acid fruits. He may be allowed ſoft fiſh, and butter-milk.

To the food of thoſe who are corpulent, fleſhy, and of a rudy complexion, ſuch cooling and drying things, as we have mentioned, may be added. They ſhould all forbear labour, fatigue, bathing, venery, walking or riding in the ſun and duſt, drinking of ſtagnating waters, blaſted fruits, or mouldy herbs; and alſo figs and grapes: becauſe theſe drive the humours

mours to the ſkin, and, filling the blood with flatulent ſpirits, diſpoſe it more to fermentation and ebullition. Their body muſt be opened, if there be occaſion, with the juice of prunes and ſugar, or with whey and ſugar. If the air be putrid and peſtilential, their face may be continually ſprinkled with the water of ſanders and camphire; which, if it pleaſes God, will have a good effect.

As to ſucking infants; if they are fat and ruddy, and above five months old, let them be cupped; and let the nurſe, as far as poſſible, be managed in the manner we have mentioned.

I come now to thoſe medicines which thicken and cool the blood, and check its ebullition and putrefaction.

All acid things are proper for this purpoſe, eſpecially the water called *al-raib*, that is, the ſour, bitter water which ſwims upon butter-milk expoſed to the ſun; and the acid juice of citrons.

The ſame intention is very well anſwered by many things, which have an aſtringency joined with their acidity, and thereby condenſe the blood. Such are, ſour grapes, ſumack, rob ribas, or the inſpiſſated juice of currants, apples, quinces, and pomegranates; jujubes, lentils, coleworts, coriander, lettuce, poppies, endive, night-ſhade, ſugar called *bambu* *, the ſeeds of fleawort, and camphire.

The following compoſition is good to cool the blood, and reſtrain the heat of the liver, and effervescence of the bile.

Take of red roſes beaten, ten drachms; bambu-ſu-

* The Indian name for a concreted juice, like ſugar, in an Indian reed.

gar,

gar, twenty drachms; ſumack, the ſeeds of wild ſorrel, lentils peeled, barberries, the ſeeds of purſlain, ſeeds of white lettuce, of each five drachms; red ſanders, two drachms and a half; camphire, one drachm.

Let theſe be mixed, and give three drachms of this powder to the patient every morning in his drink, together with an ounce of the juice of wild ſorrel, or of ribas, pomegranates, or unripe grapes, and the like.

The medicine al-ſacangjabin, that is, oxymel with ſugar, is likewiſe good, which is thus prepared.

Take one part of red, ſharp vinegar, depurated; two parts of roſe-water; mix, and infuſe in the cold mixture, one ounce of red roſes; half an ounce of balauſtines; two ounces of pomegranate-peel, for the ſpace of three days. Then ſtrain the liquor, adding to it, according to the quantity of the vinegar, twice or thrice as much of the ſugar tabarzad, that is, white ſugar-candy. Boil it ſufficiently, and uſe it.

It will alſo be of uſe to take of roſes and bambu-ſugar, of each ten drachms; white ſanders, three drachms; camphire, one drachm; and moiſten them with the mucilage of the ſeeds of fleawort; then make the maſs into pills, or troches. Of theſe, at proper times, three drachms may be given in the patient's drink, together with one ounce of the aforeſaid al-ſacangjabin.

Beſides theſe, the following ſyrup is excellent, and wonderfully exceeds in virtue all others, which I have ſeen tried; though perhaps the ſyrup of pearls, which the Indians deſcribe, and of which they boaſt more than they can have experienced, may be more powerful. For they ſay, that if any one drinks of that

ſyrup, though nine puſtules have already appeared, there will not come out a tenth.

Now, the compoſition of mine is this.

Take of red vinegar depurated, old, and ſharp, three pounds; of the juice of acid pomegranates, the acid juice of citrons, the juice of unripe grapes, of ribas, of the Syrian mulberries, the expreſſion of Syrian ſumack, and barberries, of each one pound; the juices of lettuce and tarragon, of each a quarter of a pound; of the decoction of red jujubes, and the infuſion of lentils, each a pound and half. Mix all together, and add three pounds of ſugar; boil the whole, and put to it ſome of the ſyrup already made, hot, working it with a peſtle, till it is diſſolved: then mix it with the whole, ſtirring it continually with a ſtick of camphire-wood; throw it into a mortar of ſtone, or willow-tree wood, taking out the cleareſt part all the while; having added and mixed bambu-ſugar and camphire. Uſe this before the ſmall-pox appears, and alſo after the appearance, as we ſhall direct anon. It is alſo proper in all diſtempers, which ariſe from a bilious blood, in peſtilential ulcers, boils, quinſeys, and the like.

What I have ſaid may in general ſuffice concerning preſervation from the ſmall-pox, before the fever, which attends their ſigns, comes on.

The laſt-mentioned ſyrup repels the diſeaſe from one, who is in ſuch a condition, that it can be repelled; ſo that what comes out will be very moderate. It alſo effects, that the change of the blood from the firſt ſtate to the ſecond, ſhould not be done too haſtily, and at once, with too great ebullition, and frightful and dangerous ſymptoms; but by degrees,

grees, and in a longer time; in the way of maturation, not putrefaction, without terrible and dangerous fevers.

But when the fever, which accompanies the eruption, ariſes, this regimen is no longer to be uſed, unleſs with great caution and prudence; for a miſtake here is very dangerous, for this reaſon, that while the blood is rarefied, and nature, according to the temperament of the patient, is endeavouring to expel the morbific matter; if then the refrigeration and condenſation, which you intend, does not exceed the cool ſtate the patient was in before, it will happen, that the ebullition will break out a ſecond or third time; and thus nature will be diſturbed in her work. Neither can that ebullition be checked, without great danger: for thoſe remedies muſt be uſed for this purpoſe, which do in a manner congeal and coagulate the blood; ſuch are, opium, hemlock, a great quantity of juice of lettuce, night-ſhade, and the like. And the congelation of the blood, and extinction of natural heat, by all theſe, is not ſafe; becauſe of the exceſs, which is eaſily committed: for it will be hard, at the ſame time to repreſs the effervescence, and preſerve the due natural heat. In one word, care muſt be taken, not to extinguiſh preternatural and natural heat together

Now I ſhall communicate a practice, which phyſicians, either through ignorance or avarice, that they only may receive profit from it, uſually conceal; and it is this. When you obſerve, upon the ſigns of the diſeaſe, a diſtenſion of the belly, pain in the back, redneſs of the face and eyes, a violent headach, with a full pulſe, and alſo a ſtraitneſs of breath, a red and

turbid urine, and ſuch a heat of the body, as a man feels, who has been for ſome time in a hot bath; eſpecially, if the body be fleſhy; there is then all the reaſon in the world to take away blood. Wherefore, draw away a good quantity, even till the patient faints away. It will be beſt to do it from the baſilic vein, or ſome of its branches; but if that cannot be found, from the cephalic vein. Sometimes, when the baſilic does not appear, it may be taken away from the vein in the ancle; but better from the baſilic or its branches, becauſe they draw from the greater veins in the abdomen more than the cephalic does.

If the ſymptoms do not run very high, although they are manifeſt, draw blood but ſparingly; and when they are leſs, take away very little. Then proceed in the cure with repelling medicines, as has been mentioned.

If by theſe the feveriſh heat is removed, and the pulſe and breath are come to their natural ſtate; ſtill inſiſt on the uſe of them, till the heat of the diſeaſe is perfectly abated, which will be done in a ſhort time.

In order more effectually to perform this extinction, let the patient drink water, made cold in ſnow to the higheſt degree, very plentifully and often; ſo that he may feel the coldneſs of it in his bowels. If, after this, the fever and burning return, give this water, a ſecond time, two or three pints, or more, in the ſpace of half an hour.

If ſtill the heat return, and the belly be full of water, make him vomit it up, and then give it again. And if the water finds a paſſage, either by ſweats or urine, you may be aſſured the patient is in a good way.

But

But if the water does not paſs, and the heat returns as it was at firſt, or even is more violent; omit giving the water ſo often, and have recourſe to the other extinguents, which have been deſcribed; and if the patient finds relief, perſiſt in the uſe of them. If, on the contrary, you perceive, that they produce an intolerable uneaſineſs and inquietude, you may certainly know, that the eruption of the ſmall-pox or meaſles is at hand. Wherefore you muſt quit this method, and haſten to aſſiſt nature, in expelling her ſuperfluities in the manner I ſhall deliver in the following chapter.

CHAP. VI.

Of thoſe things which haſten the eruption of the ſmall-pox.

THE eruption of the ſmall-pox and meaſles is promoted by the following means. The patient muſt be well wrapped up in cloaths, and his body rubbed all over. He muſt be kept in a room not very cold; he ſhould drink frequently, a little at a time, of cold water, to provoke ſweat, and aſſiſt the protruſion of the humours to the external parts.

The ſick perſon muſt put on a double ſhirt, the borders of which muſt be bound. Underneath him, place two ſmall baſins of very hot water, one before, and the other behind him; ſo that the vapour may come to the whole body, except the face; by which means the ſkin will be rarefied, and diſpoſed to receive the erumpent humour. For the ſurface of the body may, in this caſe, be compared to a leech, which, to cool

cool its own heat, attracts whatſoever it can. And by this management, not only is the ſkin ſoftened, but the ſtrength of the patient is alſo preſerved; ſo that nothing can be more proper.

As to furnaces and baths, they are both deſtructive at this time, by ſo overheating and weakening, that a ſwooning follows; by which nature is diverted from its work with great danger, if the fit be violent and long: for nothing is a greater indication of the approach of death, the natural heat retiring into the inner parts; after which it will be ſoon oppreſſed and extinguiſhed by the over-abounding humours. Likewiſe, when the hot vapour, which I have directed, is uſed, it muſt never be ſuffered to cool upon the body; but is preſently to be wiped and dried off, with great diligence. This method is abundantly ſufficient to forward the coming out of the diſeaſe, when nature is not languid, or the humours too thick and viſcid.

But in caſe it happens, that the outward fever is indeed mild, but anxiety and inquietude continue, and the eruption is difficult; you muſt wait till the fifth day is over, and then uſe thoſe medicines which promote the eruption. But this is to be done with great caution and all manner of attention, in the way which I have mentioned, when ſpeaking of the rules to be obſerved in giving extinguiſhing remedies: for an errour here, although it be not ſo great as the other, yet is alſo dangerous. And the caution conſiſts in not being too haſty in giving theſe medicines, but to inſiſt upon the former regimen, as long as there is any proſpect of ſucceſs without them; and as long as you are not yet certain, that the fever is too remiſs

miſs in the inward parts, as well as it is in the outward. This you will eaſily know, by the pulſe and reſpiration not being too quick, full, or irregular; and if, in feeling the breaſt, you do not find it hot in the higheſt degree. For though the fever be doubly or trebly increaſed, it will not therefore be mortal; as you may judge by comparing this with other fevers, which you have obſerved in perſons of the ſame temperament, and in the ſame degree of heat with your patient, who nevertheleſs have recovered.

Theſe extinguiſhing remedies are alſo to be applied when, as ſoon as the puſtules appear in the ſkin, the patient feels himſelf to be pretty well, and his pulſe and breath are eaſy. But if, on the other hand, the eruption goes on ſlowly and with difficulty, they muſt be abſolutely forborn: for to uſe them, is to ſtrive againſt nature, and check the protruſion. And when any anxiety follows upon the uſe of extinguents, eſpecially a palpitation of the heart, be ſure that you have committed a great errour. You muſt therefore immediately take all poſſible pains in ſoftening the ſkin, in the manner I have taught; and give to drink frequently warm water, either alone, or in which fennel and ſmallage ſeeds have been firſt boiled, and the like ſimples which conduce to the eruption; according as the heat of the patient and his ſtomach will bear them; regard alſo being had to the ſlowneſs of the pimples in coming out.

This is the deſcription of an eaſy, gentle medicine, which, without too much heat, promotes the eruption.

Take yellow figs to the number of thirty; raiſins, the

the ſtones being taken out, twenty drachms; pour upon them three pints of water, and let them boil till they are diſſolved. Give to the patient of this liquor half a pint, at three ſeveral times. Then cover him up well in cloaths, and foment the body, as is above directed.

The following is yet more powerful.

Take of the aforeſaid decoction four ounces; of the decoction of fennel and ſmallage ſeeds, two ounces: let the patient drink it, as has been directed.

One ſtill more efficacious is this.

Boil fennel-ſeeds and ſmallage-ſeeds, of each ten drachms, in an earthen veſſel, till the water is red; ſtrain it, and give three ounces at a time.

Laſtly, this compoſition is very good and uſeful, at ſeveral times.

Take of red roſes four drachms; of lentils decorticated nine drachms; yellow figs ten; of gum tragacanth three drachms; of white raiſins ſtoned, ten drachms; lack, cleared from its ſticks and waſhed, three drachms; fennel and ſmallage ſeeds, of each five drachms. Boil all theſe in three pints of water, to one pint: ſtrain the liquor, and give half a pint of it, with a ſixth part of a drachm of ſaffron, twice or thrice, as there may be occaſion.

We ſhall now ſpeak of thoſe parts of the body of which care is to be taken.

CHAP.

CHAP. VII.

Of taking care of the throat, eyes, &c. as ſoon as the puſtules have appeared.

AS ſoon as ever the ſigns of the ſmall-pox appear, particular care muſt be taken of the eyes, the throat, the noſe, and ears, and alſo of the limbs, in the way I am going to deſcribe. Nay, ſometimes it will be neceſſary to extend our care even to the ſoles of the feet, and the palms of the hands: for oftentimes violent pains ariſe in theſe parts, the hardneſs of the ſkin hindering the eruption.

Upon the firſt appearance of the ſigns, drop roſe-water into the eyes now and then; alſo waſh the face with cold water often in a day, and ſprinkle the eyes with the ſame. For if the diſeaſe be mild, this method will prevent the puſtules breaking out in them. This indeed is to be done, for greater caution; for in the mild ſort, it ſeldom happens, that any puſtules break out on the eyes. But in a bad ſort, when you ſee a large eruption in the beginning, with an itching of the eye-lids, and redneſs of the white of the eyes, ſome places of which are redder than others; you may be aſſured that the ſmall pox will break out there, unleſs great help be given: therefore immediately drop roſe-water, in which ſumack has been infuſed, into the eyes, ſeveral times in the day.

It will be ſtill more effectual to apply a collyrium, made of galls in roſe-water, by dropping it into the eyes; or to inſtill into the eyes what is ſqueezed from the pulp and ſkins of the four pomegranate, firſt

chewed. Then waſh the eyelids with a collyrium, made of the water of quinces, the juice of unripe grapes, box-thorn, aloe, and acacia: of each of theſe let there be one part, and a tenth part of ſaffron; and drop ſome of it into the eyes.

But if you obſerve a turgeſcence in the humours, and the eruption to be very copious, ſo that puſtules will certainly fall upon the eyes, becauſe redneſs appears here and there in their white part, from the exceſs of the inflammation; and alſo find, that what you have applied does not remove that redneſs, but only leſſen it for a time; after which it returns more violently than before, or at leaſt continues as it was, when you began this treatment; you muſt not proceed any longer in this method, but, inſtead of theſe things, drop into the eyes ſome of the acid liquor expreſſed from mouldy bread, with the Nabathæan bitter, in which there is no vinegar, or other acid.

As to the puſtules which break out in the tunica cornea of the eye, theſe darken the ſight, and are to be cured, according to the degree of their thickneſs, by ſuch diſſolving remedies as I am going to deſcribe: which indeed are ſometimes effectual, and ſometimes not; the ſucceſs depending upon the matter being more or leſs thick, and upon the greater or leſs firmneſs and drineſs of the body.

But if large puſtules ſhew themſelves in the tunica uvea, uſe the collyrium of roſe-water ſeveral times in the day and night with great diligence; or elſe that before mentioned, leaving out the ſaffron; inſtead of which, put a ſmall quantity of blood-ſtone, to keep down the ſwelling.

Theſe things are what ought to be known concern-

ing

ing the eyes. Care is next to be taken of the throat and mouth, leſt any eruption there ſhould grieve the patient, and hinder his breathing; for it often happens, that, in a bad kind of the diſeaſe, terrible ſuffocations are brought on, which leave no hopes of a recovery.

Therefore, on the firſt appearance of the ſigns of the ſmall-pox, let the mouth be gargled with the water of acid pomegranates, or of ſumack, or with the juice of mulberries, or with ſome of thoſe things which we have recommended, (chap. V.), under the head of extinguent remedies; or laſtly, if nothing elſe be ready at hand, with pure cold water; and that very often, to prevent a great eruption into the throat and mouth, and ſtrengthen thoſe parts, or at leaſt hinder what is already broken out there from cauſing a ſuffocation. Be quick therefore, and diligent in applying this cure, eſpecially, if from a hoarſeneſs of voice, ſtraitneſs in breathing, and a pain in the throat, a neceſſity of it ſhall appear.

Moreover, if the ſtrength will bear it, take away blood from the cephalic vein; and that even after the whole eruption is over. And if the patient find any thing in his mouth, or throat which hurts him; and yet there is not too great a heat there, neither are his bowels too looſe, let him lick by degrees of freſh butter mixed with white ſugar-candy. But if there be any heat and inflammation there, give a linctus of this kind.

Take of ſweet almonds decorticated one part; of the ſeeds of gourd two parts; of white ſugar-candy three parts; the mucilages of the ſeeds of fleawort, and of laurel-berries; a linctus of gum-arabic, almonds

monds peeled, and the seeds of the plane-tree, and wheat-flower: mix all these with a mucilage of quince-seeds.

In the next place, let us take care of the limbs; for upon these a number of very bad pustules often arise, which corrupt them to such a degree, that the muscles, tendons, nerves, and the bones themselves lie bare. Assist therefore immediately, if you observe the signs of the disease to be violent and excessive; that is, bathe the limbs with sanders, quince-water, Armenian bole, roses, camphire, vinegar, and rose-water: but take care not to overdo it. If the pustules are very large, open them with an incision-knife, to let out the matter: and delay not this operation; for the case is dangerous.

Now let us come to the cure of the nose and ears, lest they should be over-filled with the pimples: for this will greatly afflict the patient; and when they break out in the internal part of the ear, there is danger of their coming presently into the nose. Take therefore a cotton cloth, upon which camphire has been broken; by the help of this, put into the ear fragrant wine-vinegar, to which has been added quince-water, or the juice of box-thorn. Do this in the morning, and repeat it twice or thrice a-day.

Lastly, if a great pain arises in the soles of the feet, prepare instantly to anoint them with warm oil, and foment them with warm water and cotton. If this does not assuage the pain, nor facilitate the eruption, beat up decorticated sesam with milk; anoint with it, and bind it on with cloths, and leave it upon the part all night. In the morning, put the foot into warm water; and repeat the same again.

Or

Or bruiſe dates with butter, and apply them; or, laſtly, anoint with the lees of the ſeſamine oil. For theſe and the like things ſoften and relax the ſkin; and by this means diminiſh the pain, and promote the eruption.

CHAP. VIII.

Of ripening the ſmall-pox.

WHen, after the eruption is completed, you obſerve the puſtules tend too ſlowly to maturity, and yet that the patient is otherwiſe in a very good way, as to his reſpiration and pulſe, and pretty free from inquietude and anxiety; then it behoves you to aſſiſt the maturation of the puſtules.

But if, together with a backwardneſs of ripening after the eruption, you perceive the puſtules to become hard and warty, and the patient not at all better; or if his illneſs increaſes; then you are to know that the ſmall-pox is mortal. Wherefore have no thoughts of ripening the puſtules; for they are of that kind which cannot be ripened.

Now, the maturation of the ſmall-pox, if curable, is to be effected by fomenting the body with the ſteam of a hot decoction in water of camomile, violets, melilot, marſh-mallows, and bran, either ſeparate, or collected together in two baſins; as we have directed above, where we treated of facilitating the eruption.

And if then the patient ſeems to find relief and refreſhment by the fomentation, you are to abſtain from thoſe fumigations which are commonly employed for

for drying up the puſtules; until they ripen of themſelves, and are capable of bearing thoſe things which contribute towards drying them up: of which we are now going to treat.

CHAP. IX.

Of drying the puſtules.

IF the puſtules are large and very numerous, they muſt be dried; or the fluid contained in them muſt be ſoaked up with fine clean cotton, in which there is nothing that may hurt the patient. And then let fumigations be made with the leaves of dried roſes, or with the leaves of the ſtorax-tree, or with ſanders, or with the leaves of the iris, or the tamariſk: and indeed roſes are more convenient in ſummer, but tamariſks in winter.

The ſmall-pox ſometimes abounds with too much moiſture. When that happens, order the patient to lie on pounded roſes, or on rice-meal, or on millet-meal, with which a mattreſs of a thin texture is ſtuffed.

If the body be full of puſtules, lay moiſt leaves of the iris under the patient; and beſprinkle him with an aromatic powder made of aloe, frankincenſe, ſarcocol, and dragon's blood.

But if the puſtules break ſpontaneouſly, or from the quantity of the fluid contained in them, and are ſlow in drying, treat them in this manner.

Take of ſeſamine-oil one ounce; of Andarene * ſalt

* Andar is a village, a mile diſtant from Aleppo, where a very white foſſil ſalt is found. See Maundrell's journey.

pounded

pounded fine, and of alum, each two drachms. With this liniment anoint the body, carefully avoiding thoſe places which are ulcerated or excoriated, or even too near an approach to them; becauſe the medicine would raiſe a violent inflammation. Let the liniment lie on the parts for the ſpace of an hour; then waſh it off with a decoction in water of emblic myrobalans, white tamariſk-berries, myrtle-leaves, and pomegranate-peels.

If the puſtules are dried by theſe means, it is well; if not, take the whiteſt ſort of bole (not the red bole), add to it of Andarene ſalt, and of dry bread crumbled fine, each a tenth part. Make a liniment, with which rub the ſkin; let it lie on for an hour or two, and then waſh it off.

Now we are to treat of taking off the dried ſcales, and cruſts, or eſchars.

CHAP. X.

Of taking away the dry ſcabs and eſchars.

WHen the ſmall-pox is withered, and the dry ſcales and eſchars ſtill remain on the ſkin, examine them well; and to thoſe that are ſmall, and thoroughly dried up, apply warm ſeſamine-oil every now and then, till they are ſoftened, and fall off: but thoſe of the face are to be managed with oil of piſtaches. For the larger ſort, which reſemble eſchars, if you find any moiſture remaining in them, cut them off carefully, without any application of oil. And if the places from whence you have removed the eſchars, contain but little moiſture, it is to be dried up with ſoft

ſoft cotton, as I have already ſaid: but if they contain much, they are to be dried gradually; beſprinkling them with the red aromatic powder, compoſed of aloe, frankincenſe, ſarcocol, and dragon's blood, eſpecially if they begin to leſſen, and ſink in; and with alum and Andarene ſalt, if they are even with the reſt of the ſurface of the body, and do not ſink in: then wait till a new eſchar or ſcab is formed on them. If there be any return of moiſture, repeat the ſame dreſſings. And in fine, when the moiſture is entirely exhauſted, then anoint the parts with oil, until the cruſts are ſoftened, and all fallen off.

Next follows a diſcourſe on deſtroying the marks of the ſmall-pox.

CHAP. XI.

Of deſtroying the marks of the ſmall-pox.

THE marks of the ſmall-pox are of two ſorts: for they are either in the eye, or on the reſt of the body. Now, with reſpect to the eye, the part on which the ſmall-pox broke out, has an opaque whiteneſs in it, as we have already obſerved. If this happens in the eyes of children, or young perſons of a moiſt conſtitution of body, and tender ſkin, it will be the more eaſily deterged.

Now, the medicines which deterge the eye, and take off the whiteneſs, are theſe: borax, or nitre made into cakes, Andarene ſalt, ſal-ammoniac, glaſs, the ſcoriæ of glaſs, coral, tutty, lapis hæmatites, verdigreaſe; baſtard ſponge, the ſea-crab, the dungs or excrements of ſparrows, ſwallows, ſtarlings, mice, bats,

bats, and of the Arabian or Lybian lizard; muſk, the ſediment of urine; the acorus, ebony, cornel-water, Arabian ſugar, dregs of vinegar burnt, myrrh, ſandaracha or juniper gum, commonly called *varniſh*, gums of the olive and bitter almond trees, and the milky juice of wild lettuce. It will be beſt to uſe theſe, when the patient is juſt come out of the bath, or after holding his head over the ſteam of hot water. But mild medicines alone, nay the mildeſt of theſe, are to be employed, eſpecially in ſoft and moiſt bodies.

The deſcription of a mild medicine, which removes the white ſpecks from the eye.

Let the eye be ſprinkled with ſarcocol, and white ſugar-candy.

Another more efficacious.

Let the eye be ſprinkled with baſtard ſponge, ſarcocol, and ſugar.

Another ſtill more powerful.

Take of verdigreaſe ten drachms; myrrh, ſagapenum, ſal-ammoniac, ſarcocol, of each two drachms and a half; baſtard ſponge, ſcoriæ of glaſs, and borax, or nitre in cakes, of each three drachms. Then take of ſweet cane ten drachms, and the ſame quantity of cornel-water. Boil theſe in ten times the weight of water, till the decoction becomes thick: then diſſolve the gums in it, and mix all well together into an ophthalmic collyrium. Afterwards, as occaſion ſhall require, to this mixture add ebony in an oil-bottle. Cleanſe the part affected gently and often with a needle or ſtyle; taking care to apply the collyrium frequently, both before and after the operation. And laſtly, ſprinkle it with the powder of

the milder ſort of the medicines. But be ſure to look carefully into the eye every day. For if it be painted, or look angry, omit this treatment for ſome days, and then repeat it; for this method of cure is very powerful and efficacious.

As to the medicines, which take off the marks of the ſmall-pox from the face and the reſt of the body, they are theſe: white litharge, dried reed-roots, rotten bones powdered, baſtard ſponge, coral, ſarcocol, almonds, birthwort, the ben-nut, radiſh-ſeed, pumpion-ſeed, rocket-ſeed, the flower of beans, rice, lupins, and kidney-beans. On theſe pour the aqua amurcæ, and barley-water.

The deſcription of a liniment, which effaces the marks of the ſmall-pox.

Take of the flower of chiches and beans, each three drachms; of pumpion-ſeed five drachms; of white litharge two drachms; of dried reed-roots three drachms. Pound all together in barley-water: then apply it to the parts ſeveral times ſucceſſively, after the patient has received the ſteam of hot water, or after coming out of the bath. Then again waſh him in a bath, made of pumpion-rinds, dried violets, bran, and pounded chiches, boiled in water: rub him well, and apply the liniment a ſecond time.

The deſcription of another liniment of greater efficacy.

Take of bean-meal five drachms; bitter-almonds, ſweet coſtus, rocket-ſeed, and radiſh-ſeed, of each two drachms and a half: apply it, as we have already directed.

Another liniment more efficacious ſtill.

Take of bitter almonds peeled five drachms; radiſh-

diſh-ſeed, rocket-ſeed, roots of coſtus, and long birthwort, of each two drachms and a half; of borax, or nitre made into cakes, three drachms; of pepper one drachm and a half: uſe them as we have already directed. Afterwards, waſh the parts with radiſh-water, or with thoſe things which we have ordered. And thoſe are the medicines which efface the marks and ſcars of the ſmall-pox,

But in order to efface the pock-holes, and render them even with the reſt of the ſurface of the body, do thus: Let the body be anointed with butter, and well tinged with the herb cyperis, or with its powder; let the patient uſe the bath frequently, and be rubbed down after it.

Now we are to direct what ought to be given to a patient in the ſmall-pox by way of aliment, and to treat of the medicines which have relation to it.

CHAP. XII.

Of the diet of patients in the ſmall-pox.

TO a patient in the ſmall-pox it is neceſſary to give barley-water, prepared in the ſame manner, and with the ſame art, as that which is uſually given to perſons in acute and hot diſeaſes. If the fever be moderate, and the body ſomewhat coſtive, it muſt be ſweetened with white ſugar-candy; but if the heat of the fever be intenſe, and the body looſe, pour to it half a meaſure of the juice of acid pomegranates, pounded with their ſeeds: but the pulps and inward thin tunicles are to be avoided; for they are laxative.

If the patient be reſtleſs, and cannot ſleep, add to

the barley-water ſome proportion of poppy. But if the body be very looſe, add to the barley-water one part of dry ſeeds of acid pomegranates, and one part of poppy.

But, if it be requiſite to bind the body, inſtead of barley-water, take meal of peeled barley, and the meal of pomegranate-ſeeds; boil theſe in the ſame manner as barley-water is made, and let the ſick drink of this, as he would drink of barley-water either alone, or with bambu-ſugar and gum-arabic mixed with it, if a looſeneſs ſhould make it neceſſary; or with the medicines which I ſhall deſcribe anon. For barley-water, mixed with pomegranate-juice, is very ſerviceable in the ſmall-pox, and more eſpecially in the meaſles. But the waters of the gourd, of the Indian pumpion, and of the cucumber; the mucilage of fleawort-ſeeds, and the like, of whatever kind, which make a mild phlegm, and eaſy to be ſpit up; theſe waters, I ſay, are more uſeful in the meaſles, than in the ſmall-pox; unleſs it be in thoſe ſorts of the ſmall-pox, which are accompanied with a malignity and heat, together with a violent fever and want of ſleep.

But in thoſe caſes of the ſmall-pox, wherein the fever and inflammation are not ſo vehement, thoſe things above mentioned, and others of the like kind, have no other effect, but to render them flower, and to protract the whole courſe of the diſeaſe: wherefore it will be your buſineſs to have recourſe to this or that ſort of medicines, or to abſtain from them, as occaſion ſhall require. For when the ſmall-pox happens to be in the higheſt degree of heat and putrefaction, with the addition of moiſture; then thoſe things which have a cooling, drying, and condenſing quality, are more proper; ſuch as juice of pomegranates,

granates, verjuice, and others of the ſame nature.

But when the diſeaſe is the meaſles, which ariſe from a vehement ebullition of the bile blended with the blood; thoſe things which have the twofold virtue of cooling and humecting, are the moſt proper in their cure; inaſmuch as the corrupted blood is tempered and corrected by their means. For the blood of a perſon, in the meaſles, is like ſtagnating water, which putrefies by long ſtanding; whereby its natural texture is deſtroyed, and, by the action of the ſun, it contracts a vitious acrimony. But if theſe waters are mixed with rain, or any other running ſweet water, they ſoon recover their former wholeſomeneſs.

Moreover, in the ſmall-pox barley-gruel is beneficial, if it be taken with ſugar and pomegranate-juice, or with a proper quantity of julap; giving due attention to the patient's looſe or coſtive ſtate, as likewiſe to his greater or leſſer degree of heat: except that barley-water is lighter to take, eaſier to ſwallow, and more ſuitable to the throat and breaſt. Wherefore, act according to theſe directions, after you have been appriſed, that barley-water is more proper for perſons in the meaſles, than in the ſmall-pox; unleſs the ſmall-pox happen to be of a bad ſort, in the manner we have mentioned.

As to the reſt, vetches well cleanſed are good in the ſmall-pox, if a food be prepared of them with the juice of acid pomegranates, or with vinegar: the meal of lentils is uſeful alſo, if the meal be wrought up with cold water.

Know likewiſe, that cold water is more ſerviceable to a patient in the meaſles, than in the ſmall pox; as being ſafer, and of a more certain effect.

Now,

Now, when you ſee the ſmall-pox attended with great inflammation, and a ſtoppage in the pulſe and reſpiration; then give extinguiſhing medicines, proportioned to the ſymptoms: if they are leſs urgent, employ few; if very urgent, employ many.

But never allow the eating of young birds, until the pulſe and breath have returned to their natural ſtate; nor till the puſtules are thoroughly withered, and the ſcabs fallen off

Let us now turn the diſcourſe upon looſening the belly, and reſtringing the ſame in the ſmall-pox.

CHAP. XIII.

Of managing the diſcharges of the belly, in the ſmall-pox.

THE belly is generally looſe in the ſmall-pox and meaſles towards their decline, but eſpecially in the meaſles. For which reaſon, every thing muſt be avoided which opens the body, after the ſmall-pox and meaſles are conducted to the end; even though the body be bound. But if it be lax, inſtantly abſtain carefully from thoſe things which give ſtools: although it be neceſſary in the beginning of theſe two diſeaſes, and before they are on the decline, to give a laxative. For it is ſometimes requiſite to open the body in the ſmall-pox, either upon account of the exceſs of heat and pain in the head; or in order to eaſe nature of her load, and leſſen the morbific matter, when you have reaſon to think it over-abundant. And it will be really ſo, when you find the body, both before and after bleeding, neither weakened nor waſted;

waſted; but, on the contrary, bloated and full, with a paleneſs, or a little redneſs, and a fluctuating pulſe. For ſometimes, in ſuch a ſtate, bleeding will not be neceſſary, and it will be ſufficient to evacuate the ſuperfluous humidity: and that eſpecially, when the aforeſaid ſigns evidently appear; and beſides, if, through the ſluggiſhneſs of the fever, the body be dejected, and entirely void of a red colour. In this ſtate, a very proper medicine is a decoction of yellow myrobalans, if it be drank with white hard ſugar, and the juice of an acid pomegranate, (two or three, if there be occaſion), bruiſed with the pulp and internal tunicles. For it is the quality of theſe two medicines to purge the body of the ſuperfluous humours, together with part of the bile, without raiſing any heat; eſpecially the pomegranate-juice; and to leave nothing behind them in the inteſtines. And this is the beſt medicine which can be given in this caſe.

But in the meaſles give the juice of Damaſcene plums, and the plums themſelves, freſh gathered, either alone, or bruiſed with julap, adding ſugar to them. But avoid the medicine called *tarangioben* *; for it is as prejudicial in the meaſles, as honey is in the ſmall-pox; both upon account of the exceſſive heat which it occaſions, and of increaſing the nauſeating and uneaſineſs of the ſick. In like manner carefully avoid giving them the juice of ivy, or of the black violet to drink; becauſe they both equally heighten the diſorder in the body.

Now, whereas the firſt and moſt neceſſary remedy

* A ſort of manna among the Sogdians, Medes, and Babylonians, which concretes on the leaves of certain ſhrubs, and is gathered thence.

in

in the ſmall-pox, is to draw blood, when it is too much in quantity, or there is no proſpect of checking its ebullition by any other means, even by extinguents; but there is a neceſſity for taking a little away, as well for relieving nature, as for abating the fulneſs of the blood-veſſels, and eaſing them of their over-great load, which muſt otherwiſe be productive of very bad conſequences; eſpecially if the blood be heated to that degree, that a violent inflammation might enſue: in the ſame manner it behoves you, in the beginning of the meaſles, to draw off ſome of the bile, when you perceive it over-abundant; and then to purſue what remains of it by extinguents. Now, the ſign of an exceſſive redundancy of the bile is, the violence of the inflammation, and the uneaſineſs, together with the diſcharge of the ſame bile, both by vomit and ſtool, and a bitterneſs in the mouth.

But if the quantity of the bile is not exceſſive, and yet there is an uneaſineſs, and thirſt, and vehement heat, without any appearance of bile, either by vomit or ſtool; though its quantity, I ſay, be not exceſſive, we may however judge it to be of a bad quality, in proportion to the violence of the inflammation and uneaſineſs.

And this is what I have thought proper, that you ſhould know, concerning the management of the diſcharges of the belly, when it is looſe in the beginning of theſe two diſtempers. Now, if the belly be lax, give nothing laxative; for in this caſe, any thing that increaſes the diſcharges is not ſafe in either of the diſtempers. But while the belly continues looſe, order the patient, inſtead of barley-water, to drink barley-gruel; and if it be neceſſary, boil the barley-gruel with

with meal of pomegranate-ſeeds; of which let him drink, before he returns to the uſe of barley-water. And if, this notwithſtanding, the looſeneſs ſtill increaſes, mix gum-arabic and bambu-ſugar in his drink in this manner.

Take of gum-arabic two drachms; of bambu-ſugar one drachm: reduce them to the conſiſtence of a collyrium: then on four ounces of the barley-gruel pour ſome of the medicine which I am going to deſcribe; let it ſtand for an hour, and give it to the patient to drink.

The deſcription of the medicine.

Take of red roſes ground fine, bambu-ſugar; ſorrel-ſeed, ſumack, and barberries, of each equal parts; alſo gum-arabic, ſealed earth, poppy-rinds, balauſtines, or pomegranate-flowers, of each half the quantity: let the patient drink three drachms of theſe, with one ounce of the juice of acid pomegranates.

But, if the looſeneſs ſtill continues, and has weakened the patient, give him draughts of al-râib, that is, ſour ſkimmed milk, with the beſt ſort of biſcuit, and a little gum-arabic.

Finally, whenever a dyſentery appears, the method of cure muſt be taken from the place where we have treated of that ſubject.

Now, it remains, that we ſpeak of thoſe who recover, and of thoſe who die of the ſmall-pox and meaſles.

CHAP. XIV.

Of the curable and incurable ſmall-pox and meaſles.

THE ſmall-pox and meaſles are of the number of hot diſeaſes, and therefore have many things in common with them. Now, the chief prognoſtic ſigns in thoſe who recover, are, a freedom of reſpiration, a thorough ſoundneſs of mind, and an appetite for food, an agility to motion, a right ſtate of the pulſe, the patient's good opinion of his diſeaſe, a convenient poſture in bed, and but little toſſing about and inquietude of body.

Hence, a judgment may be formed of bad ſigns, the greateſt part of which we have related in the book, entitled, *Almanſori* *.

Theſe things following particularly regard the ſmall-pox and meaſles.

When the puſtules of the ſmall-pox are white, large, ſeparate, few in number, eaſy and ſpeedy in coming out, and the fever not violent or burning, nor attended with much inquietude of body or concern of mind; and are ſo qualified, that the heat, concern, and inquietude diminiſh upon their eruption, and entirely ceaſe, when the eruption is completed: that ſort is curable, and threatens little or no danger. To theſe the next in goodneſs are, white large puſtules, though very numerous and coherent; if they come out eaſily, and their total eruption eaſes the patient of his uneaſineſs and exceſſive heat, as we have already mentioned.

* There is a MS. copy of this book in the Bodleian library, Narciſſ. Marſh, N° 376.

But

But when their eruption is performed with difficulty, and the patient does not grow better upon their coming out, they are a bad ſort: although there is not ſo much reaſon to be afraid, if he ſhould be ill while they are coming out, as if he continues ſo after the eruption.

But there is a bad, and even a fatal ſort of white large puſtules, to wit, thoſe which run together, and ſpread ſo, that many of them unite, and occupy large ſpaces of the body; or become like broad circles, and in colour reſemble fat.

As to thoſe puſtules which are white, very ſmall, coaleſcing, hard, warty, and contain no fluid; they are of a bad kind: and their badneſs is in proportion to the degree of difficulty in their ripening, and to the continuance of the ſymptoms on their eruption. But if the ſymptoms are not abated, after the eruption is finiſhed, it is a mortal ſign.

Thoſe puſtules alſo are all bad, which turn green, purple, or black. But if, beſides, a ſwooning and palpitation of the heart come on; this is the worſt ſign of all, nay a ſign of certain death.

And when the fever increaſes after the eruption of the ſmall-pox, it is a bad ſign. But if the fever ceaſes at the time of the eruption, it is a good ſign. Doubled puſtules indicate a great quantity of the matter of the diſeaſe: and if they are of the curable kind, they portend recovery; but if of the mortal kind, death.

Thoſe meaſles are the ſafeſt, which have not too much redneſs: but if they turn pale, it is a bad ſign; the green and purple ſorts are both mortal. When either the ſmall-pox or meaſles ſink in ſuddenly, after

they began to ſhoot out; and then the patient is ſeized with inquietude and anxiety, and a ſwooning comes on; it is a ſign of ſpeedy death; unleſs they puſh out again, after they have ſubſided.

If the puſtules appear on the firſt day of the fever, they will haſten their progreſs, and be of quicker motion: if the eruption is protracted to the third day, it will advance moderately; but if the firſt appearance paſſes the fourth day, the eruption will be completed dully and ſlowly.

When the appearance begins on the good critical days, it is a ſalutary ſign, eſpecially if the patient finds himſelf better at the end of the eruption; and ſo on the contrary. But when the puſtules begin to run into one another, and to ſpread; and at the ſame time the inquietude increaſes conſiderably, and the belly ſwells or is bloated; then death is near at hand. When the ſmaller ſort of puſtules, which contain no fluid, grow hard; and a delirium comes on at the ſame time; the patient is near his end. When it happens that the ſmall-pox and meaſles appear and diſappear alternately, and are attended with anxiety and a delirium; this is a ſign of death, of what colour ſoever the puſtules are: but it is ſeldom the caſe of white puſtules, or of thoſe which ripen quick. When towards the end of the ſmall-pox there is a great perturbation of the humours, and the patient is ſeized with a very violent pain in a leg, hand, or any other limb; or the puſtules are ſpeedily converted into a green or red colour; and thereupon he grows weaker than he was before, and the weakneſs ſtill increaſes by the quick returns of the pain, and the limb contracts various colours; theſe are ſigns of death.

But

But if nevertheleſs the patient grows ſtronger, he will recover, and that limb will be cured.

Now, if you ſcarify that limb the very moment when the pain begins to ſeize it, you will render great ſervice to the patient, if he grows ſtronger after the inciſion; and the limb will alſo be preſerved from mortification.

But, in this dangerous caſe, nothing cooling muſt be applied to the limb, upon any account whatſoever: but either ſcarify it, or plunge it into hot water, if you ſee that the patient can bear it.

Wherefore, as we have run over all the articles, which we propoſed to ourſelves; and have amply enough treated, both of this diſeaſe, and the method of preſervation from it; we here break off the thread of our diſcourſe.

To the beſtower of ſtrength to finiſh this work, be praiſe without end, as he is worthy of being celebrated and praiſed.

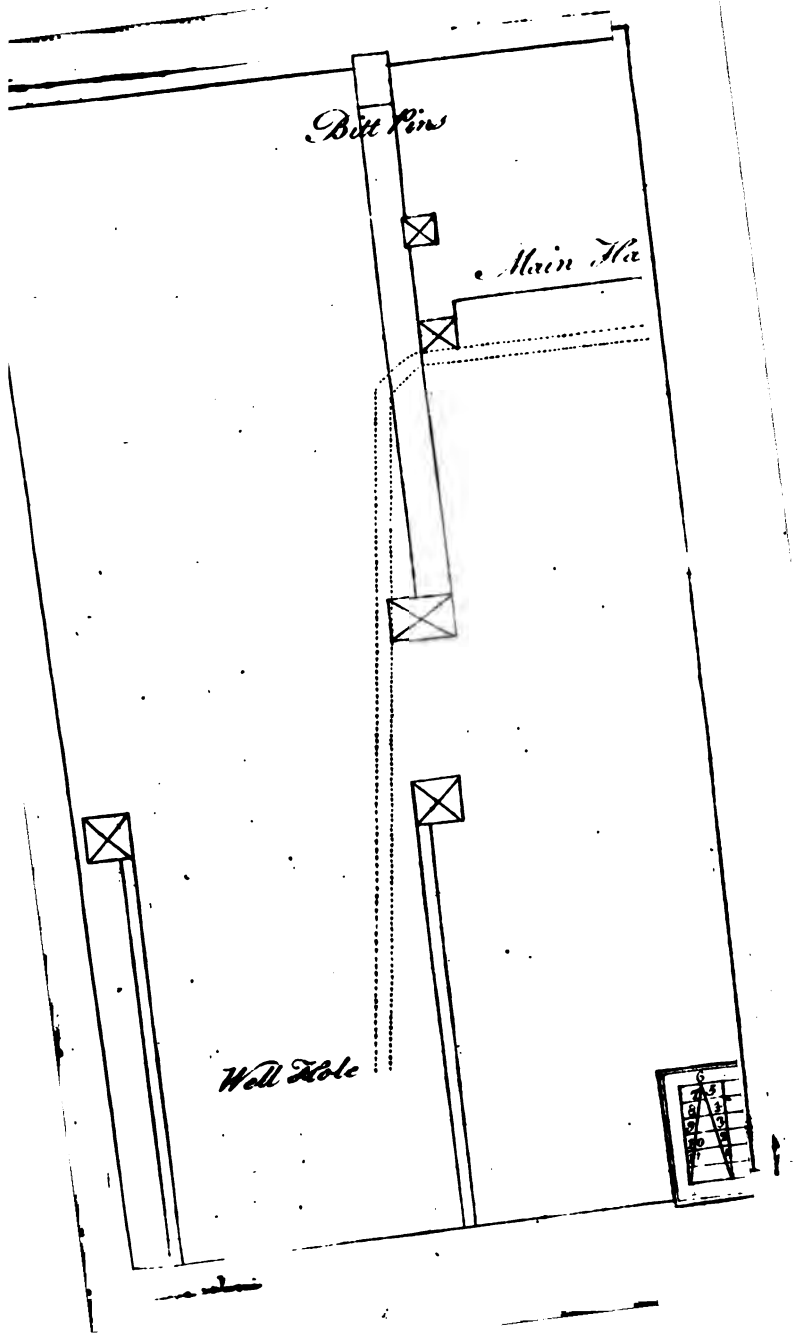
An HISTORICAL ACCOUNT of a NEW METHOD for extracting the foul AIR out of SHIPS, &c.

PREFACE.

I Have often ſaid, that it is not, in our country at leaſt, ſo eaſy a thing to ſerve the public, as is commonly imagined; not meaning hereby the difficulty of finding out uſeful experiments, (although even that is great enough), but the hardſhips which attend the putting them in practice. Whence this ſhould come to paſs, it is foreign to the preſent purpoſe to inquire. They who are acquainted with the ſeveral motives upon which men often act, among which ſelf-intereſt, envy, pride, and obſtinacy, have no inconſiderable ſhare, will readily ſee the ſprings of this ſeemingly unaccountable diſpoſition of mind.

I would not have it thought, that I have had occaſion to make this ill-natured remark, from what I may myſelf pretend to have done for the benefit of the public: but it is ſufficiently juſtified by the oppoſition which the invention deſcribed in the following treatiſe has met with. The machine is ſo ſimple, and of ſo extenſive advantage, that as it is ſurpriſing to ſee the greateſt pains taken to make it abortive at firſt, ſo it is no leſs ſtrange that it has not been ſo univerſally uſed, in the royal navy, as might have been expected from the great good which it promiſes.

It is not my buſineſs to examine the cauſes of this neglect;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leſt; which is in a very moving and handſome nner complained of in the voyage of the great Lord ſon *; an immortal work, which will be always d with a pleaſure, equal to the benefit to be reap- from it, with regard to our navigation and com- erce to thoſe parts of the world, to which the ad- ntures relate.

As this hero is not leſs admired for his humanity d good ſenſe, than for his conduct and courage; e has taken care that the relation of his enterpriſes ould be a monument of the one, as well as of the ther. The accounts given of that ſtrange diſeaſe, ſo atal to our ſeamen, the ſea-ſcurvy, are hints ſo new and uſeful in phyſic, that I have thought it not unbe- coming the place with which I am honoured in my profeſſion, to write a ſhort diſcourſe on this ſubject, and give it to the honeſt and ingenious author, to be publiſhed together with his reprinted Account of a new method for extracting the foul air out of ſhips, &c.: an invention, which, I may venture to ſay, does honour to our nation, and will in time be found of more public benefit than any diſcovery in mechanics, which has been produced theſe hundred years.

Having therefore had the ſatisfaction, in the begin- ning, to recommend this experiment to the admiral- ty, I now join a ſhort diſcourſe on the ſcurvy to the reprinted edition of Mr Sutton's book, as a convincing and happy proof of the ſucceſs which attends it. And the author has alſo added ſome other authentic accounts to the ſame purpoſe. From all theſe things duly conſidered, it is to be hoped that the evil ſpirit of oppoſition, which, as is mentioned in Mr Sut-

* See p. 36. 37.

ton's

ton's account, &c. exerted itſelf even againſt the making a trial, will now be rebuked and caſt out.

To conclude, as any one verſed in mechanics will eaſily ſee (as we formerly obſerved) that this management of the air may be applied to many other purpoſes of life, (to ſome inſtances of which I have been an eye-witneſs), ſo it will prove a great loſs to mankind, if it is not univerſally brought into practice: eſpecially, ſince, by the generoſity and diſintereſtedneſs of the inventor, the whole expenſe may be conſidered as a trifle. Many more conſiderations might be urged; but they will readily occur to the wiſdom of thoſe whoſe province it is to direct our naval affairs.

The foregoing preface was written, and ready to be put to the preſs, when Mr Sutton brought me the agreeable news, that the Right Honourable the Lords of the Admiralty had juſt then given him orders, to provide all the ſhips of his Majeſty's navy with this uſeful machine. Thus, laudable diſcoveries, though diſcountenanced at firſt, do at laſt break through all difficulties, and meet with ſuitable encouragement.

R. M.

An HISTORICAL ACCOUNT of a NEW METHOD for extracting the foul AIR out of SHIPS, &c.

SIR,

PUrſuant to your deſire, I now ſend you an hiſtorical account of my ſcheme, together with the reaſons that firſt inclined me to employ my thoughts about it. In the year 1739, I was informed by a gentleman, that the ſailors on board the fleet at Spithead were ſo dangerouſly ill for want of freſh air, that they were put aſhore to recover their health; and the ſhips to which they belonged, ſtunk to ſuch a degree, that they infected one another. In compaſſion to my fellow-creatures, I thought myſelf obliged to do all that was poſſible for their relief in theſe unhappy circumſtances, and from this time tried what could be done by fire. I at length found, that by ſtopping the air out of a room that had three fire-places, and making two large fires in two of them, I could bring the air to draw down the third chimney, with ſuch force as to put out a candle. I then lighted a fire in the other chimney; which ſo rarefied the air in the room, that the incumbent air preſſed to enter in, and with a force ſufficient to raiſe a pully with half a hundred weight; and as ſoon as the room was cooled, by the coming in of the air, the door would ſhut, and then open again in three minutes.

Having proceeded thus far with good ſucceſs, I ſtopped up all the chimneys in the houſe, the garret excepted, and then lighted two large fires, which

drew the air down the chimney with ſuch violence, as to put out four or five candles immediately: whereupon I concluded, that, a fire being always kept on board a ſhip, and a pipe or cavity made to the well, one end of it being heated by fire, a change of air would follow, and that by this means rendered ſweet and pure, and fit for reſpiration.

From this time I made it my buſineſs to conſult the officers and ſailors of the navy, who all agreed that ſuch a change of air would be of the greateſt uſe imaginable, in preſerving the lives of the men on board his Majeſty's ſhips. I particularly remember, that, being at a coffeehouſe near the admiralty, I placed myſelf nigh ſome gentlemen of the navy, and inquired of them, as I had before of others, as to the uſefulneſs of the forementioned change of air, who all, to a man, acknowledged that it would be of the utmoſt ſervice; and, upon their unanimous approbation of it, I told them that I could procure ſuch a change of air: upon which one of the company went to another table, and the reſt followed him; and I heard him tell the others, that he heartily pitied me, as being really mad, and out of my ſenſes.

Upon this unexpected treatment, I reſolved to apply to ſome perſon of conſequence in the navy, of approved integrity; and well knowing that Sir Charles Wager was a gentleman of this character, and withal of the greateſt humanity, I waited upon Mr Gaſhery, a commiſſioner of the navy, and acquainted him that I would communicate my invention to Sir Charles, by word of mouth; and that if I did not, in a few minutes, convince him of its uſefulneſs, I would withdraw

withdraw immediately, without giving him any further trouble about it.

Mr Gaſhery was ſo kind as to ſpeak in my behalf to Sir Charles, and thereupon I was introduced into his preſence. I deſired Sir Charles to be ſo good as to permit me to aſk him ſome queſtions relating to my affair, which he was pleaſed to permit. I aſked him, whether he had ever conſidered the principles upon which the operations of the cupping-glaſs were founded? that, rarefaction being made in the glaſs by means of the fire, and the glaſs preſſed to the ſkin, the air in the blood preſſes out the ſkin; and, the ſkin being cut, and a ſecond rarefaction made, the blood preſſes forward to the place where the rarefaction was made. I told him, that in like manner I propoſed to procure a change of air on board his Majeſty's ſhips, by means of a fire in the cook-room, and laying proper pipes for that purpoſe.

Sir Charles, upon my diſcourſe with him about my ſcheme, not only expreſſed his approbation of it, but favoured me with the following letter to Sir Jacob Ackworth, ſurveyor of his Majeſty's naval works.

SIR,

THE bearer hereof, Mr Sutton, has found out a method to extract the foul air out of the wells of ſhips, which will be of great uſe for preſerving the lives of the men aboard his Majeſty's ſhips. He will be willing to talk with you, if an experiment can be made, ſo that he may not loſe the benefit of the invention.

I accordingly waited on Sir Jacob, who ordered me to come to him again, five days after, at ſeven in the morning; at which time he being engaged in buſineſs, I waited at the office till evening, when he was pleaſed to expreſs himſelf to me in the following words: "Sir, I ſuppoſe you intend to throw air "into the wells of ſhips." I anſwered, "No; I "propoſed to draw it out by means of fire." Upon this he aſked me, "if I knew how far I was to draw "it out?" I replied, "Not ſix inches: for, if I "could extract it never ſo ſmall a diſtance, the in-"cumbent air would preſs forward of courſe, and, "in ſo doing, cauſe a conſtant change." He admitted this. I then told him, that I waited upon him, by Sir Charles Wager's orders, in hopes that he would appoint a time for an experiment to be made of my ſcheme: to which he replied, "that no experiment "ſhould be made, if he could hinder it."

Upon this diſappointment, I petitioned the Lords of the Admiralty, and thereby obtained an order from them to the commiſſioners of the navy, to cauſe my experiment to be tried on board the Greenwich man of war, then lying at Woolwich. I forthwith carried their Lordſhips order to Woolwich, and purſuant thereto, to the ſatisfaction of myſelf, and all on board the Greenwich, I placed the pipes, and all things neceſſary for my experiment, except the ſoldering of two pipes; but, whilſt the ſolder was hot, and the plumber in readineſs to ſolder them, a meſſenger from the builder of his Majeſty's yard came to order the workmen aſhore. I thereupon repaired to the builder, who acquainted me, that I muſt apply to the navy-board, to procure an order to have my experiment

ment performed on board the hulk at Woolwich. I inſtantly replied, that, all the proper preparations being already completed, except the ſoldering of two joints, which might be done in an hour's time, I deſired it might be tried immediately. But to this he made anſwer, that I muſt apply to the navy-board, in order that they might procure an order from the Lords of the Admiralty for the trying it on the hulk aforeſaid. I thereupon told him, that I inſiſted on thoſe two joints being ſoldered, that I might make my report to the Lords of the Admiralty, that I had faithfully executed their order: upon which, he aſſured me, they ſhould be ſoldered that very night: but when I went on board the next day, to ſee if they were ſoldered, I found them juſt as I left them the day before.

Finding myſelf thus diſappointed, I took a candle, and went down to the pipes, which were carried through deck, and laid under the beam, towards the well, about thirty feet in length from the copper; and, as ſoon as I put the candle to the ends of the pipes, they immediately extinguiſhed the flame: which fully convinced thoſe on board of the great uſefulneſs of my invention. But, to my extreme ſurpriſe, I no ſooner came on ſhore, than I found, that the maſter afloat was ſent from the King's yard, to take down my pipes, and plug up the holes: upon which, perceiving the obſtructions my experiment would meet with, I determined to apply to ſome gentlemen of the faculty of phyſic, that were proper judges of the uſefulneſs of my ſcheme.

Being no ſtranger to the character of Dr Mead phyſician to his Majeſty, diſtinguiſhed as much by his humanity

humanity as his abilities, I went directly to his house, shewed him Sir Charles's letter, and, by his appointment, the next morning came thither again, where I met the learned Martin Folkes, Esq; president of the royal society, whom the Doctor had desired to talk with me, together with himself, upon my proposal. They both expressed their approbation of it, and most readily offered to do whatever was in their power, to encourage an invention which they judged must be of great service to the public. Accordingly Dr Mead immediately waited on the Lords of the Admiralty, and represented to them in a strong manner, the advantage of such a contrivance: whereupon they were pleased to order, that it should be tried as soon as possible, on board any of his Majesty's ships in the river.

Being now left at my own liberty, to chuse a proper place for my experiment, I fixed upon the hulk at Deptford, because that was immoveable, and could not, like a ship, be sent away: and upon this I directly went to Deptford, in order to make the necessary preparations. I was soon acquainted there, that several of the workmen belonging to the King's yard were busily employed in trying the usefulness of another machine, industriously set on foot to supplant mine: but, after the strictest inquiry I have since been able to make, I cannot learn that they had any orders to that purpose from the Lords of the Admiralty.

This proceeding, together with the excessive shiness and caution of the gentlemen of the yard, led me to conclude, that my scheme, at last, would be set aside, in spite of all the steps I could take to prevent it;

it; and I was confirmed in this opinion, when I found the pipes were made of wood, between five and ſix inches wide, in ſuch an unworkmanlike manner, that, to render them tight, I was forced to get ſize and paper from Deptford, to put over the joints; and that moreover many hands were employed in erecting wind-ſails, in order to ſhew, that they could thereby procure as much air as my ſcheme would afford.

At length, in September 1741, the day appointed for the trial of the experiment came; when the Lords of the Admiralty, the Commiſſioners of the Navy, Dr Mead, Martin Folkes, Eſq; and ſeveral other members of the royal ſociety, being preſent on board the ſaid hulk; Sir Jacob Ackworth was pleaſed to ſay, in the hearing of them all: "I am ſorry that "you are come to ſee the trial of ſuch a fooliſh ex- "periment, that I tried myſelf yeſterday, and it would "not ſhake a candle." To this I replied, "It "would be in good humour to-day, and the end of "every one of the pipes would blow out a candle." And accordingly, notwithſtanding the forementioned obſtructions, and that the tarpawlins were taken away, which I had ordered to be laid over the hatches, I was as good as my word; and all the lords and gentlemen aforeſaid, upon the trial of my experiment, expreſſed their approbation of the performance.

In November following I was ſent for by the meſſenger to the Commiſſioners of the Navy, and by them, purſuant to an order from the Lords of the Admiralty, ſent down to Portſmouth, to prepare the Norwich man of war according to my ſcheme; and, upon this occaſion, Sir Charles Wager, in the preſence of the Lords of the Admiralty, honoured me with

the

the following letter to Commiſſioner Hughes at Portſmouth.

SIR, *Admiralty-office, Nov.* 24. 1741.

I Send this by Mr Sutton, who has found out a way to draw bad air out of cloſe places, particularly from wells of ſhips, which you know are ſometimes ſo bad, as to ſtifle men before they can be drawn up; as happened on board the Lynn, while I was at Helvoet-Sluys; one man being killed by it, and two narrowly eſcaped. This contrivance is approved by much wiſer men than I am in ſuch things; and therefore I deſire you would let Mr Sutton have all the encouragement and aſſiſtance you can give him.

I take Mr Alleyn, your builder, to be an ingenious man; if you recommend Mr Sutton to his care, he will ſee that he meets with no obſtruction or diſcouragement from any body, that may think themſelves wiſer. There is an order from this board to the navy, from whom you will have it, to have the Norwich, who is to go to the coaſt of Guinea, to be fitted according to Mr Sutton's ſcheme; which will be a very good experiment. I am,

SIR,

Your humble ſervant,

CHARLES WAGER.

This letter I carried down to Portſmouth, and delivered to Commiſſioner Hughes, who received me in a very friendly manner, and recommended me to Mr Alleyn the builder; who both of them (and indeed all the

perſons belonging to the yard) exerted themſelves to the utmoſt of their power, to forward my undertaking; and at length I completed it, agreeable to the plan I ſhall hereafter exhibit.

Having finiſhed this buſineſs, I waited ſome days at Portſmouth, for a report ſigned by Admiral Leſtock, and ſeveral commanders of ſhips, which Captain Gregory gave me reaſon to expect: but, at laſt, (though to do the Captain juſtice, I muſt own, that he treated me, whilſt at Portſmouth, in an obliging manner), I was acquainted, that no report could be made till the Norwich returned from its voyage; which was ſent to Guinea, and from thence to the Weſt Indies: which conſtrained me to repent of my journey.

Soon after my return to London, I found things in the utmoſt confuſion, by the ſudden change of the miniſtry, which likewiſe occaſioned a change in the admiralty. I petitioned however the commiſſioners of the navy, humbly requeſting them to make a report of what I had done, from time to time, from the 10th of July to the 10th of December 1741, at Greenwich, Deptford, and Portſmouth, in compliance with the orders of the Lords of the Admiralty; in order that I might receive a ſuitable reward for my uſeful invention, and reaſonable ſatisfaction for my trouble, loſs of time, to the neglect of my other affairs, and expenſes in the execution of the ſame. But I received no anſwer, nor to many petitions I delivered to the Lords of the Admiralty themſelves; until at length, juſtly moved at the cold and unkind treatment I met with, I freely expreſſed my ſenſe of their hard uſage, in the following petition.

To the Right Honourable the Lords of the Admiralty,
The petition of Samuel Sutton,

Humbly ſheweth,

THat your Lordſhips petitioner, having invented an uſeful ſcheme, for the extracting foul air out of his Majeſty's ſhips, (which, in the month of September 1741, was tried before the then Lords of the Admiralty, who approved the performance), lately applied to your Lordſhips; but, to his extreme ſurpriſe, he finds, that he is not likely to receive any reward, either for the invention itſelf, or his loſs of time and expenſes: nor are his Majeſty's ſailors and mariners likely to receive any benefit from his ſcheme; though it is univerſally acknowledged, that more of them have lately died in America, for want of good air, than by the Spaniards. That your Lordſhips petitioner cannot help remarking, that, though no invention ever met with more applauſe from the public than his, never was any man (himſelf excepted) employed by the Lords of the Admiralty, from time to time, at his own charges, as he has been, without a proper conſideration. That your Lordſhips petitioner now deſires, that you would be pleaſed to conſider him on that account, and order him a ſuitable ſatisfaction; and as in duty bound for your Lordſhips, he will ever pray.

This petition was overlooked like the reſt, nor was there any notice taken by the Lords, either of me or my ſcheme, till Captain Gregory returned to London; who, ſoon after his arrival, ſent a letter to the then Lords

Lords of the Admiralty, in reference to the Norwich man of war, which I fitted up at Portſmouth; and the following extract of it was left at their office for me.

Extract of a letter from Captain Gregory, late commander of his Majeſty's ſhip the Norwich, to Mr Corbett, dated June 11. 1743.

AS to the air-pipes which were put on board of me, I was obliged to ſtop up two of them, by reaſon the fire came down between decks: the other to the well was kept open; but the ſhip making water enough to keep her ſweet, I was not able to judge of their uſe, having been ſo healthy as to bury only two men all the time I was on the coaſt.

Copy, THO. CORBETT.

I have many remarks to make upon this letter, which by no means can be juſtly called a report, ſince the other officers of the ſhip were not conſulted; particularly the ſurgeon, and the carpenter, or other under-officers, the moſt competent judges; the former, of the health of the men; and the latter, of the ſweetneſs and good condition of the proviſions. As to Mr Haddon the carpenter, who had been ſeveral voyages to Guinea before, and never knew the like; he aſſured me, that the proviſions continued entirely ſound, and the men healthy, free from the ſcurvy, or any other diſorder, to the admiration of the people of Barbadoes, who there queſtioned, whether they had been at Guinea, or no: and indeed, this matter

of fact, which is the main point, is for ſubſtance acknowledged by the Captain himſelf; though, at the ſame time, he is pleaſed to ſay, "that he was not able to judge of the uſe of my pipes." This gentleman, it ſeems, loſt ſo few men that he could not diſcover the uſefulneſs of my pipes; but, had he loſt the greateſt part of his crew, I dare ſay, that he would have been able to judge that my pipes were of no ſervice at all. But, though the extract of the Captain's letter carries its own confutation along with it; yet, as it was ſent to the Lords of the Admiralty, I thought it expedient to give an anſwer to it, in the following letter to the Earl of Winchelſea.

My LORD,

THough I have petitioned the Right Honourable the Lords of the Admiralty ſeveral times, and even wrote your Lordſhip, in reference to my extracting foul air out of his Majeſty's ſhips, and never received any anſwer, except an extract from Captain Gregory's letter; yet, in juſtice to my ſcheme, I apprehended myſelf obliged to lay before your Lordſhip ſome juſt remarks on the ſaid extract, which I hope will effectually remove any inferences that may be thence drawn to the prejudice of my uſeful invention, which is founded on the moſt evident principles, and may be put in execution, at ſo eaſy a charge as about thirty pounds, in any of his Majeſty's ſhips. As to the Captain, he ſays, that he was obliged to ſtop up two of my pipes, by reaſon ſome ſparks of fire came down between the decks. But this might eaſily have been prevented, by adding

two

two pipes of tin (which they never want), three feet long, and bringing them through the chimney, by which all communication would be cut off between thoſe ſparks and it. The Captain alſo declares, that he could not tell, whether the pipe to the well, becauſe of the water in it, was of uſe or not; but, which ſeems to be very unfair dealing, he entirely overlooks two other pipes. I entreat your Lordſhip to be pleaſed to conſider, that the pipes draw more air than any kitchen-chimney, and what is ſufficient to ſweeten any ſhip in the navy. The Captain himſelf owned to me, that not ſo much as one of his men had the ſcurvy; which cannot be ſaid of any of his Majeſty's ſhips heretofore, or that, out of ſuch a number, ſo few have loſt their lives, and ſo many have returned in perfect health from ſuch a voyage: and indeed, if my ſcheme was generally put in practice, this, in all likelihood, would become a common caſe, nor would ſhips that come from infected places, have any occaſion to perform quarantine, the air being preſerved, by the foreſaid pipes, in a pure and wholeſome ſtate. I am,

My LORD, &c.

And as the principal, and indeed only, objection, in the extract, againſt my ſcheme, was the danger of fire; I wrote the following letter to Sir Jacob Ackworth, his Majeſty's ſurveyor, in order to ſhew, that it was entirely groundleſs.

Honoured

Honoured SIR,

WHen a ſcheme is propoſed for the good of mankind in general, and the preſervation of the lives of his Majeſty's ſubjects in particular; it is doubtleſs highly reaſonable, that, as it is a matter of great conſequence and importance, a ſtrict inquiry ſhould be made, whether it be practicable, and will effectually anſwer the end propoſed. As to the inconveniency apprehended to attend mine, that it will expoſe ſhips to the danger of fire, I entreat you to be ſo good as to inquire of any bricklayers, or builders, whether this apprehenſion be not entirely groundleſs. I could heartily wiſh that you would be pleaſed to ſatisfy yourſelf in this particular: as your declaration, on this point, in my favour, would have great weight with the Lords of the Admiralty; in order to my being by them appointed to have the direction of laying pipes on board his Majeſty's ſhips. I am, Sir, firmly relying on your goodneſs,

Your humble and obedient ſervant,

SAMUEL SUTTON.

Soon after, when the plague raged in Sicily, and timely precautions were taken to prevent its being introduced hither, I again wrote to the Earl of Winchelſea as follows.

My

My LORD,

A Proclamation being iſſued out for ſhips to perform quarantine, I humbly beg leave to acquaint your Lordſhip, that if my ſcheme for extracting of foul air was properly put in practice on board ſuch ſhips, it would effectually preſerve the health and lives of his Majeſty's ſubjects. And, ſuch a fume being let down as the phyſicians may judge expedient, great advantages would ariſe, without any ill conſequences whatſoever: becauſe, the foul air being conſumed by the fire, the fume, by means of a pipe let into the hold of the ſhip, will with eaſe be drawn down, there being a want of it to ſupply what is extracted. If your Lordſhip will be pleaſed to conſult the phyſicians, you will find that what I offer is practicable, being founded on juſt and rational principles. I am,

My LORD,

Your humble and obedient ſervant,

SAMUEL SUTTON.

Sir Jacob Ackworth, Mr Alleyn of Deptford, and the reſt of the ſurveyors will readily atteſt, that no damage can ariſe from the fire made uſe of in my ſcheme; which is the only objection that has hitherto been advanced againſt it.

Having thus refuted the foreſaid objection, and I hope in a convincing manner, it was natural for me to expect, without any longer delay, a reward ſuitable

ble to the importance and uſefulneſs of my invention; but it was ſome time after this, before I received the following order from the Lords of the Admiralty.

Extra.

Received the 31ſt Oct. 1743.

No 688.

Mr TREASURER,

No 2619. 1743. IN purſuance of an order from the Right Honourable the Lords Commiſſioners of the Admiralty, dated 22d October 1743, ſignifying, that, whereas Mr Samuel Sutton did, ſome time ſince, propoſe to that board an invention of his, for extracting the foul air out of ſhips by fire, and letting in freſh air, an experiment of which was ordered to be made on board his Majeſty's ſhip the Norwich, bound to the coaſt of Africa; and Captain Gregory, who commanded the ſaid ſhip, having ſince his return made a report thereof, a copy of which their Lordſhips ſent us therewith, whereby it appears, that it does not, in all reſpects, come up to the expectation, and that the uſe thereof is dangerous, and liable to accidents by fire: yet, as the ſaid Mr Sutton has employed a great deal of pains and time about the ſaid invention, for the benefit of the navy, and had encouragement from their Lordſhips ſo to do; and their Lordſhips being deſirous to give encouragement to perſons who ſhall turn their thoughts to any inventions that may tend to the advantage of the navy, do thereby deſire and direct us to cauſe a bill of one hundred pounds to be made out to the ſaid Samuel

muel Sutton, as a reward for the loſs of time and expenſes he has been at about the ſaid invention.

We pray you to pay unto Mr Samuel Sutton accordingly, the ſum of one hundred pounds. Dated 22d Oct. 1743.

J. B.
31 Oct. 1743.

JAM. COMPTON—Ca. Account.
RICH. HADDOCK.

J. B. $\left.\begin{matrix} \text{No } 2360. \\ 359. \end{matrix}\right\}$

This, Sir, was all the ſatisfaction I could procure from the Lords of the Admiralty, though I had, from time to time, executed their orders with the utmoſt fidelity, and even that, not till above two years after the trial of my firſt experiment on board the hulk at Deptford: a ſatisfaction that ſcarcely defrayed my expenſes. But I am perſuaded, from what has been already ſaid, you clearly perceive, that, as matters ſtood, if the uſefulneſs of my ſcheme had appeared in the moſt demonſtrative light, I ſhould, after all, have fallen ſhort of a ſuitable reward; and indeed this is the truth of the caſe. Dr Hales's ventilators, which were deſigned to anſwer the ſame purpoſes as my pipes, had, by ſome means or other, got ſuch an aſcendant in the eſteem and regard of ſome leading perſons in the affairs of the navy, as, in ſpite of conviction itſelf, to admit of nothing to come in competition with them; though even that darling ſcheme is now out of date and exploded. Far be it from me,

to inſult and triumph over a conquered adverſary: and it is needleſs, as well as cruel, to ſpend much time in confuting a ſcheme, that experience has abundantly ſhewn to be abſurd and ridiculous. However, I think it incumbent on me to obſerve, how much I was ſurpriſed to find no mention made by the candid author of the Deſcription of ventilators, of my invention: whereas he himſelf ſaw an experiment made before the royal ſociety with a model of it, and heard Dr Mead's account of it read to that learned body; which account was publiſhed in the Philoſophical Tranſactions ſome time before the book of ventilators was printed. Upon the whole, this is a peculiar advantage attending my invention, that its beneficial influences are perpetual, without the leaſt intermiſſion; whereas Dr Hales fully evinces the inſufficiency of any attempts to make the air in ſhips wholeſome, by only a few hours ventilation. "It were to be wiſhed," (ſays he, p. 41.), "that there ſhould not be ſo much "as one hour without ventilation, when the ports are "ſhut." His ventilators are cumberſome machines, taking up more room than can conveniently be ſpared, and require many hands to work them: my pipes take up no room, but what may be very well ſpared, and ſtand in need of no manual labour at all. His ventilators have only a caſual and uncertain, but my pipes a certain and uninterrupted effect. His ventilators cannot extract the air from the well at the bottom of the ſhip; but mine do this, and introduce pure and wholeſome air, in the place of impure and unwholeſome. His ventilators, he tells us, will keep a priſon ſweet; but my pipes will ſweeten even a hog-houſe, and may be conveyed miles under ground into

into the deepeſt mines and ſubterraneous cavities, with the ſame ſucceſs. His ventilators require much more air than my pipes, which will admit of more or leſs, as ſhall be thought expedient. And as my ſcheme, in all theſe reſpects, ſurpaſſes his; ſo his is dead and buried, without any hope of a reſurrection, whilſt mine riſes in its reputation daily: and the report of Captain Comyns, commander of the Fame privateer, which I fitted up ſome months ago, and which is returned to Liſbon with his crew in health and vigour, will give ſuch an ample and ſatisfactory atteſtation of the ſafety and uſefulneſs of my pipes, as will be ſufficient to diſpel the doubts and ſuſpicions of the moſt incredulous.

To conclude: the ſimplicity of this machine; its eaſy ſtowage without being cumberſome; its operation without any labour to the ſeamen; the ſmall expenſe to put it in execution, and maintain it; beſides its tendency to preſerve the health and lives of the ſeamen, to keep the ſhip dry, and the merchandiſe from damaging; are ſtrong reaſons why no ſhip ſhould go to ſea without it. I am,

Sir, Yours, &c.

SAMUEL SUTTON.

An account of Mr Sutton's invention and method of changing the air in the hold and other close parts of a ship; communicated to the royal society by Richard Mead, M. D. physician to his Majesty, fellow of the royal society, and of the royal college of physicians, London.

Read Feb. 11. 1741-2.

IT is found by daily experience, that air shut up and confined in a close place, without a succession and fresh supply of it, becomes unwholesome, and unfit for the use of life.

This is more sensibly so, if any stagnating water be pent up with it.

But it grows still worse, if such an air as this is made use of in respiration, that is, becomes moister and hotter, by passing and repassing through the lungs.

These bad effects, in different degrees, according to the different manner in which air is inclosed, are observed in many cases; particularly in deep wells and caverns of the earth, in prisons or close houses, where people are shut up with heat and nastiness: but most of all in large ships, in which, with the stench of water in the hold, many men being crouded up in close-quarters, all the mentioned circumstances concur in producing greater mischief, than would follow from any of them single.

The reason of these bad effects is this: it is that property

property of the air which is called its elaſticity or ſpringineſs, which makes it ſo uſeful to our life. When any part of it is incloſed and kept from the communication of the outward air, it expands itſelf, and, in proportion to the cloſeneſs of the place, loſes its ſpring; and if any heat or moiſture comes to it, the elaſtic force may be quite loſt and deſtroyed. And not only ſo, but if it happens to be impregnated with noxious effluvia, either from unwholeſome ſubſtances of any kind, or from the infectious breath of diſeaſed bodies; it will become quite poiſonous and deadly, in a manner ſuitable to the original cauſe.

It is propoſed at preſent to find out a remedy for this evil in ſhips only: but by making alterations, according as particular places require, the ſame may be applied to any houſes or parts of them, as priſons, the ſick wards in hoſpitals, &c.

Now, it is a natural conſequent of the elaſticity of the air, that when it is rarefied in any part, (which is moſt effectually done by heat), the neighbouring air will ruſh that way, till this part is brought to be of an equal denſity and elaſticity with itſelf; and this again will be followed by the air next to it; ſo that, if a conveyance for air be laid from the hold or well of the ſhip, and a rarefaction of the air therein be made; the foul air from this place will run or be drawn out that way, and freſh air from the adjacent parts will ſucceed in its room.

It is upon theſe principles that the following ſcheme is moſt humbly offered to the Right Honourable the Lords of the Admiralty, and Commiſſioners of the Navy, which it is hoped will be found effectual for clearing the bad and corrupted air from the holds, and

and other close parts of his Majesty's ships; and thereby prove beneficial to the public, by preserving the healths of many of his Majesty's good subjects serving on board the same; the whole thing being indeed easy to be executed, and what will no way incumber, or be troublesome, in any of the vessels where it shall happen to be applied: the same being, in short, no more than this: that whereas, in every ship of any bulk, there is already provided a copper or boiling-place proportionable to the size of the vessel; it is proposed to clear the bad air by means of the fire already used under the said coppers or boiling-places, for the necessary uses of the ship.

It is well known, that, under every such copper or boiler, there are placed two holes, separated by a grate; the first of which is for the fire, and the other for the ashes falling from the same; and that there is also a flue from the fire-place upward, by which the smoke of the fire is discharged at some convenient place of the ship.

It is also well known, that the fire once lighted in these fire-places, is only preserved by the constant draught of air through the forementioned two holes and flue; and that if the said two holes are closely stopped up, the fire, though burning ever so briskly before, is immediately put out.

But if, after the shutting up the above-mentioned holes, another hole be opened, communicating with any other room or airy place, and with the fire; it is clear, the said fire must again be raised and burn as before; there being a like draught of air through the same, as there was before the stopping up of the first holes: this case differing only from the former

in

in this, that the air feeding the fire, will now be ſupplied from another place.

It is therefore propoſed, that in order to clear the holds of ſhips of the bad air therein contained, the two holes above mentioned, that is, the fire-place and aſh-place, be both cloſed up with ſubſtantial and tight iron doors; and that a copper or leaden pipe, of ſufficient ſize, be laid from the hold into the aſh-place, for the draught of air to come in that way to feed the fire. And thus it ſeems plain from what has been already ſaid, that there will be from the hold a conſtant diſcharge of the air therein contained; and conſequently, that that air ſo diſcharged muſt be as conſtantly ſupplied by freſh air down the hatches, or ſuch other communications as are open into the hold: whereby the ſame muſt be continually freſhened, and its air rendered more wholeſome, and fit for reſpiration.

And if into this principal pipe ſo laid into the hold, other pipes are let in, communicating reſpectively either with the well or lower decks; it muſt follow, that part of the air conſumed in feeding the fire, muſt be reſpectively drawn out of all ſuch places, to which the communication ſhall be ſo made.

TO

TO

MARTIN FOLKES, Eſq;

Preſident of the Royal Society.

SIR,

ACording to my promiſe, I have herewith ſent you my obſervations upon Mr Sutton's machine, which I drew up ſome time ſince, and intended to lay before the royal ſociety in December laſt, before I knew either that a model would be ſhewn by Mr Sutton, or that Dr Mead would have preſented his account thereof. I am conſcious of the diſadvantages my ſlender performance muſt appear under after the reading of one upon the ſame ſubject from ſo celebrated a pen as Dr Mead's.

Theſe remarks were the reſult of ſeveral times ſeeing the machine, when firſt put in execution at Deptford. I hope it will not take up too much of the ſociety's time to read my paper this evening, and am,

SIR,

Your moſt obedient humble ſervant,

Alderſgate-ſtreet,
Thurſday morning,
April 1. 1742.

W. WATSON.

Some

Some obſervations upon Mr Sutton's invention to extract the foul and ſtinking air from the well and other parts of ſhips, with critical remarks upon the uſe of wind-ſails, by William Watſon, F. R. S.

London, Dec. 4. 1741.

Read April 1. 1742.

AS nothing is more conducive to the health of the human body, than the taking a ſufficient quantity of wholeſome air into the lungs; ſo the contrary is attended with pernicious, and often with deſtructive conſequences.

One of the great uſes of air in inſpiration is to cool the blood paſſing through the lungs, where nature has provided, according to the excellent Malpighius, that the blood ſhould be diſtributed through a vaſt number of exceedingly fine arteries, which occupy the thin veſicles of the lungs; and by this means the blood is expoſed to the air under a prodigiouſly large ſurface, whereby the putrefaction is prevented, which, from the alcaceſcent quality of that fluid, would otherwiſe be ſpeedily deſtructive.

Obſervations inform us, that contagious diſtempers are more frequent in hot climates than in cold; and in cloſely-built cities full inhabited, than in towns: the former may, in ſome meaſure, proceed from the too great heat of the air, not fully anſwering the above-mentioned purpoſes; and the latter from too

many people breathing in the ſame atmoſphere, thereby rendering it unfit for reſpiration.

It has been frequently tried, that if a gallon of air be contained in a bladder, and, by means of a blow-pipe, inſpired and expired into the lungs of a man, without having any communication with the external air; in the ſpace of a minute, or little more, it becomes heated, and unfit for reſpiration; and without the addition of freſh air, the perſon making the experiment would ſpeedily be ſuffocated. The diving-bell is another inſtance of the ſame kind, wherein a conſtant ſupply of freſh air muſt be had, to keep out the water, and refreſh the people included.

Although air is abſolutely neceſſary to our exiſtence, and neceſſity conſtrains us inevitably to breathe therein, it may be made a vehicle of moſt malignant poiſons, as witneſs the famous Grotto del Cani in Italy, the poiſoning air by charcoal, and air impregnated with the fumes of fermenting vegetable liquors. Stagnant air, either alone or mixed with water, ſoon becomes very offenſive and pernicious; as in wells dug for the ſupply of water, and diſuſed for ſome time; as is the air alſo in the wells and in the holds of ſhips, which is occaſioned principally by what is uſually called the bulge-water, which, if the ſhip is tight, and not frequently pumped, becomes not only very offenſive, but ſo extremely poiſonous, as frequently to ſuffocate thoſe ſeamen, who, as the pumps are ſubject to be clogged with filth, venture down to cleanſe them; and will cauſe alſo in perſons at a diſtance violent head-achs, cold ſweats, and frequent vomitings, which continue more or leſs, in proportion to the diſtance from the well of the ſhip,

when

when the injury was received, and the degree of putrefaction in the water and air.

The air, in ſhips particularly, is very liable to be vitiated, not only from the bulge-water, but from too many people breathing in the ſame atmoſphere; eſpecially in ſhips of war, hoſpital-ſhips, and thoſe uſed in the Guinea trade for negroes; where a number of uncleanly people, being ſtowed too cloſe together, heat the air, make it replete with noxious effluvia, deſtroy the particles therein adapted to cool the lungs, particularly the acid nitrous gas. This principle is abundant in cool air, and manifeſts itſelf not only from the quantity of nitrous cryſtallizations, which may be collected from caverns of the earth, eſpecially thoſe open to a northerly aſpect, but alſo from expoſing pieces of the fleſh of animals freſh cut, or their blood, whereby the colours of their ſurfaces are ſoon changed from a dark deep red to a more lively and florid one. Air robbed of this valuable property, and replete with hurtful ones, not only from the people, but from the ſtinking water in the well and lower parts of the ſhip, muſt produce the moſt putrid, if not peſtilential fevers.

Although the æquilibrium within places confined is maintained by the external air, yet unleſs, by openings properly adapted, the air is ſuffered to paſs freely enough, the external air proves as a ſtopple to the internal, and only mixes with that portion of it which is next in contact: this is evident from the common occurrence in privies, which are ſcarcely offenſive in clear weather, but are much ſo in foul or windy, from a diminution of the incumbent preſſure of the

atmoſphere, when the vapours that have been pent up, expand themſelves to a conſiderable diſtance.

To prevent the above-mentioned inconveniencies, and to preſerve the healths and lives of the ſeamen, that valuable part of the nation, many ſchemes have been thought of; particularly the machines of thoſe two very worthy, ingenious, and induſtrious members of this ſociety, the Rev. Dr Hales, and the Rev. Dr Deſaguliers; the firſt by an inſtrument which he calls the ſhip's lungs *, and the latter by a machine †, which is an improvement of the Heſſian bellows; but as theſe have been laid before the ſociety by the gentlemen themſelves, I ſhall paſs them over, and proceed to mention the contrivance commonly made uſe of, I mean the wind-ſails. They are made of the common ſail-cloth, and are uſually between 25 and 30 feet long, according to the ſize of the ſhip, and are of the form of a cone ending obtuſely; when they are made uſe of, they are hoiſted by ropes to about two thirds or more of their height, with their baſis diſtended circularly by hoops, and their apex hanging downwards in the hatchways of the ſhip; above each of theſe, one of the common ſails is ſo diſpoſed, that the greateſt part of the air, ruſhing againſt it, is directed into the wind-ſail, and conveyed, as through a funnel, into the upper parts of the body of the ſhip. Theſe muſt be hung up and taken down every time they are uſed, and the ſupply by this method is not conſtant. Though cuſtom has given a ſanction to this device, it is ſubject to many inconveniencies. 1*ſt*, Each ſhip having commonly

* See Dr Hales's treatiſe of ventilators. † See Philoſ. Tranſ. N° 437.

three

three of theſe, (one to each maſt), the ſeamen are a conſiderable time in getting their apparatus ready, and in hoiſting them up to make uſe of. 2*dly*, They can only be uſed in mild weather. 3*dly*, Near the equator, where freſh air is moſt wanted, there ſometimes happen ſuch ſtark calms, that they are uſeleſs, by not having air enough to diſtend them. 4*thly*, The air hereby admitted paſſes only into the upper and more open parts of the ſhip, ſo that the well, &c. receive no change therefrom; and it is obſerved, that ſometimes, upon uſing them after ſome diſcontinuance, they drive offenſive air into the cabin, and more airy parts of the ſhip: like as the pouring ſome freſh into ſtinking water makes the whole ſtink, though in a leſs degree. 5*thly*, They are improper to be uſed in the night-time, when the people are ſleeping between decks. And laſtly, admitting they had none of the former inconveniencies, their uſe muſt be deſtructive in hoſpital-ſhips; where, though freſh air imperceptibly received, is abſolutely neceſſary to preſerve the crew as free as poſſible from the infectious breath and exhalations of the diſeaſed and wounded ſeamen; yet blaſts of wind, pouring impetuouſly into the very places where the ſick lie, muſt be attended with ſuch conſequences as are too obvious to mention.

To remedy theſe inconveniencies, to prevent the air proving foul even in the wells and holds of ſhips, and to cauſe imperceptibly a large circulation of freſh air into every part of the ſhip at all times, Mr Sutton has invented the following ſcheme, which is uſeful not only in theſe caſes, but, by altering ſome parts as particular places require, may be applied to houſes,

houſes, the cloſe parts of priſons, wells at land, privies, hoſpitals, &c.

Nothing rarefies air ſo conſiderably as heat, which whenever it cauſes a diminution in the denſity of the air, that part next in contact will ruſh in, and be ſucceeded by a conſtant ſupply, till the air becomes of an equal degree of elaſticity. Therefore, if a tube be laid in the well, hold, or any other part of the ſhip, and the upper part of this tube be ſufficiently heated to rarefy the impending column of air, the æquilibrium will be maintained by the putrid air from the bottom of the tube, which being drawn out this way, a ſupply of freſh air from the other parts of the ſhip will ſucceed in its place; which operation, being continued, will entirely change the air in all parts of the ſhip. This principle, exactly conformable to the doctrines of pneumatics, is the baſis of Mr Sutton's machine, which being put in execution on board the hulk at Deptford, before the Lords of the Admiralty, Commiſſioners of the Navy, our very learned and ingenious Preſident, M. Folkes, Eſq; Dr Mead, &c. performed to their ſatisfaction, in bringing air from the bread-room, horlop, and well of the ſhip at the ſame time, in ſuch quantity, that large lighted candles being put to the end of the tubes, the flame was immediately ſucked out as faſt as applied, though the end of one of the tubes was above twenty yards diſtant from the fire. The method is as follows.

To boil the proviſions of the ſhip's company, they muſt have a copper, which is bigger or leſs, in proportion to the ſize of the ſhip, and number of the crew; this copper is fixed in ſhips in the manner as

on

on land, having under it two openings divided by an iron grate. The firſt opening, having an iron door, is for the fire; the aſhes from the grate drop through into the bottom of the other; the ſmoke paſſes through a chimney, and is diſcharged as uſual. After the fire is lighted, it is ſupported by the air from the parts next the aſh-pit; but having, contrary to the uſual cuſtom, adapted an iron door, like the former, made very tight, to prevent the ingreſs of air, the fire would ſoon be extinguiſhed, if not ſupplied by ſome other aperture: in order to which, one or more holes are made through the brick-work in the ſide of the aſh-pit; and tubes of lead or copper, fitted cloſely in the holes, and made faſt, are laid from thence into the well, and other parts of the ſhip; by which means the air next the bottom of the tubes ruſhes through them, and the foul and ſtinking air ſucceeding is tranſmitted through the fire, and paſſes off, without offending, by means of the chimney; and a ſupply of freſh air from the other parts of the ſhip continually fills the place of the former, the fire requiring a conſtant ſupport. This ſupport will not be wanting, not only during the continuance of the fire, but while any warmth remains in the fire-place, copper, or brick-work, as was obſerved on board the hulk at Deptford, where the draught of air through the tube laſted above twelve hours after the fire was taken away. This being conſidered, as the dreſſing the proviſions for a number of people will take up ſome hours every day, the warmth of the brick-work and flues will continue a draught of air from one day to the next. Mr Sutton propoſes thus to circulate the air by the ſame, and

no

no greater expenſe of fire than is cuſtomarily uſed for the neceſſities of the ſhip.

The operation of the machine will be equally uſeful in large as in ſmall ſhips; for the greater the number of people they have on board, the larger quantity and longer continuance of the fire will be neceſſary to dreſs the proviſions; and therefore there will be required a greater quantity of air to ſupport that fire. The ſize and number of the tubes need not be ſpecified; becauſe as the circulation of air is in proportion to the quantity of fire; the wider the tube, and greater the number of them, the leſs the velocity of the air, and *vice verſa*.

I ſeveral times took notice in this machine, when, for the ſake of obſervation, after the fire was well lighted, the loweſt iron door was left open, that the flame did not aſcend ſo high, or burn ſo fierce; but immediately upon ſhutting thereof, when the draught of air was only through the tubes, the flame ſoon recovered its former vigour.

There is likewiſe, eſpecially in large ſhips, not only a copper, but alſo a fire grate like thoſe uſed in kitchens: that the heat and ſmoke of this alſo may not be uſeleſs, an iron tube may be fixed behind the grate, and inſerted quite through the brick-work, and through the deck, ſo that one end thereof will ſtand about a foot, or little more, in the chimney above the brick-work, and the other will enter into the hold, or any other part of the ſhip; the upper end of this tube then being heated, the draught of air will be ſupplied from below, as in the other caſe. This likewiſe was tried on board the hulk, with an iron tube about two inches and an half in diameter, and the lighted

lighted candles held at the bottom of this tube were extinguiſhed as faſt as by any of the others.

It may be objected, that a number of tubes take up too much room, eſpecially in merchant-ſhips, and are ſubject to be broken or injured by loading or unloading: to remedy which, it is adviſeable, that only one tube of a convenient ſize be made faſt unto the ſide of the aſh-pit, and, as ſoon as it comes through the main deck, to compreſs it (a circular or any other form being equally uſeful) not too cloſe; and it may be divided into as many ramifications as may be thought neceſſary, (eſpecially as the bread-room, ſtore-room, &c. cannot be kept too ſweet, a branch for each of theſe); and theſe branches may be carried between the beams which ſupport the deck, till they come to the ſide of the ſhip, and there be let down likewiſe between the beams into the places intended; by which contrivance their operation will not in the leaſt be obſtructed, and the tubes be ſecured from any accident.

The ſimplicity of this machine, it being ſo little cumberſome, its operation without any labour to the ſeamen, the ſmall expenſe to put it in execution, and maintain it, beſides the forementioned conſiderations, are other arguments for its general uſe.

Continuation of the hiſtorical account of a new method, &c.

SIR,

SInce my firſt letter to you, giving an hiſtorical account of my method for extracting foul air out of ſhips, &c. I have made ſuch improvements in it,

that I am convinced it is now perfect, and will produce all the benefits that can be expected from a free circulation of fresh air in close places; without any of those imaginary inconveniencies, that by some few were apprehended from it. And my conviction does not arise from the truth of the principles alone, on which it is founded; but likewise from impartial experiments made with my machine during long voyages in several parts of the world; and ample testimonials of its salutary effects, wherewith I have been honoured; the most material of which you will find at the foot of this letter.

I have now the satisfaction to inform you, that my invention has at length surmounted all obstacles through the wisdom and zeal of the present Right Honourable the Lords of the Admiralty, and the Right Honourable and Honourable the principal officers and commissioners of his Majesty's navy, who, having taken the whole affair into their serious consideration, were so thoroughly satisfied of the great advantages that must accrue to the nation from the faithful execution of my scheme; that the said principal officers and commissioners of his Majesty's navy have contracted with me for fixing my engine on board his Majesty's ships, whether laid up, or in commission: for which act of general concern, as I well know the warmth of your heart for the good of our country, I doubt not but you will readily concur with me in making cordial acknowledgments to their Lordships, and those Honourable gentlemen in the name of the public.

Yours, &c.

SAMUEL SUTTON.

Extract

Extract from Lord Anſon's voyage, 4to edit. p. 36. ſhewing the want of an engine to extract the foul air.

THE Captains of the ſquadron repreſented to the Commodore, that their ſhips companies were very ſickly, and that it was their opinion, as well as their ſurgeons, that it would tend to the preſervation of the men to let in more air between decks; but that their ſhips were ſo deep, they could not poſſibly open their lower ports. On this repreſentation, the Commodore ordered ſix air-ſcuttles to be cut in each ſhip, in ſuch places where they would leaſt weaken it.

And on this occaſion I cannot but obſerve, how much it is the duty of all thoſe, who, either by office or authority, have any influence in the direction of our naval affairs, to attend to this important article, the preſervation of the lives and health of our ſeamen. If it could be ſuppoſed, that the motives of humanity were inſufficient for this purpoſe; yet policy, and a regard to the ſucceſs of our arms, and the intereſt and honour of each particular commander, ſhould naturally lead us to a careful and impartial examination of every probable method propoſed for keeping a ſhip's crew in health and vigour. But hath this been always done? Have the late invented plain and obvious methods of keeping our ſhips ſweet and clean, by a conſtant ſupply of freſh air, been conſidered with that candour and temper which the great benefits promiſed thereby ought naturally to have inſpired? On the contrary, have not thoſe ſalutary ſchemes been often treated with neglect and contempt? And have not

ſome of thoſe who have been intruſted with experimenting their effects, been guilty of the moſt indefenſible partiality, in the accounts they have given of theſe trials? Indeed, it muſt be confeſſed, that many diſtinguiſhed perſons, both in the direction and command of our fleets, have exerted themſelves on theſe occaſions with a judicious and diſpaſſionate examination, becoming the intereſting nature of the inquiry; but the wonder is, that any could be found irrational enough to act a contrary part, in deſpite of the ſtrongeſt dictates of prudence and humanity. I muſt however own, that I do not believe this conduct to have ariſen from motives ſo ſavage, as the firſt reflection thereon does naturally ſuggeſt: but I rather impute it to an obſtinate, and in ſome degree ſuperſtitious, attachment to ſuch practices as have been long eſtabliſhed, and to a ſettled contempt and hatred of all kinds of innovations, eſpecially ſuch as are projected by landmen, and perſons reſiding on ſhore.

Teſtimonials of the advantages and ſucceſs of my machines for purifying the air in ſhips, and other cloſe places.

NUMB. I.

Extract of a letter from Rear-Admiral Boſcawen to Mr Corbett, dated in Table-bay, 9th April 1748.

THE ſquadron, as well as the troops, who are with me, are ſurpriſingly healthy, and have been ſo in general our whole paſſage: which I attribute in a great meaſure to our having touched at the iſlands, where I procured refreſhment.—But at the ſame

ſame time I cannot help thinking, the air-pipes fixed in the men of war have been of great ſervice in this particular, by purifying the air between decks, and thereby preventing the ſcurvy.

In addition to what I have ſaid above of the air-pipes, I cannot help obſerving to their Lordſhips, that the bulge-water on board the Namur in particular, has not been the leaſt offenſive the whole paſſage; though it was ſo bad when we laſt went into Portſmouth harbour, that three or four men were like to be ſuffocated, by only coming near the well; and therefore I cannot but recommend them as things highly uſeful on board his Majeſty's ſhips.

NUMB. II.

MR Joſeph Hatton, carpenter of the Warwick man of war, during her voyage to Guinea, and the Weſt Indies, mentioned above, p. 211. declared at the navy-board, that on the accident of breaking the chain of their pump, it fell with a kink in the chain, ſo that it could not be got up or down; wherefore he was obliged to go into the well, in order to cut a ſcuttle in the pump to clear the kink: that he remained in the well near five hours in a conſiderable depth of water, without any ill effect on his health; which he imputes to the pipes being fixed on board the ſaid ſhip, for extracting the foul air.

NUMB. III.

CAptain Petre, commander of the Sandwich, in the ſervice of the Eaſt-India company, on board of which ſhip Mr Sutton had conſtructed one of his machines,

machines, declared at the navy-board, that on his return from a China voyage in 1747, when he put in at Ireland, he ordered ſome of the bulge-water to be brought up; and it differed not in ſmell from other common ſea-water, but differed in colour as the liquor of bohea from green tea.

NUMB. IV.

Extract of a letter from Captain William Liſle, commander of his Majeſty's ſhip the Vigilant, at the Cape of Good Hope, April 10. 1748.

I Gave you an account of all that occurred till I left Madeira, in a letter from thence: however, that you may form a better idea of the tedious paſſage to this place, I ſhall juſt mention the dates of our departure from the ſeveral ports we touched at in our paſſage. We left Spithead the ſecond of November, Liſbon the twenty-fourth of January, and arrived at the Cape of Good Hope the twenty-ſecond of March; by which you may obſerve, that our paſſage from Madeira to this place was juſt eleven weeks, and our whole voyage from England full five months, if we fix each month at twenty-eight days: which is a long time to be getting but little more than half-way to our journey's end; but though long, yet it has been attended with very few bad circumſtances: and particularly in regard to the health of the ſeveral ſhips companies, and all the troops in general, never were people more healthy; which I cannot but ſuppoſe is entirely owing to the new-invented ventilators *, and

* N. B. Theſe are Mr Sutton's air-pipes.

the

the large quantity of muſtard-ſeed allowed by the government to the ſeamen by way of experiment. The Dutch who reſide here, ſpeak of it as a miracle, and make it the chief ſubject of their converſation.

An abſtract of the letters patent, granted by his Majeſty, for the aforeſaid invention.

GEORGE the Second, by the grace of God, of Great Britain, France, and Ireland, King, Defender of the faith, &c. To all to whom theſe preſents ſhall come, greeting. Whereas our truſty and well-beloved Samuel Sutton, of our city of London, brewer, hath, by his petition, repreſented unto us, that he has, after long ſtudy, much pains, great expenſe, and repeated experiments, found out, and brought to perfection, a new invention or method for extracting foul air out of ſhips by means of fire, and will equally contribute to the removing of all noxious air whatſoever, and may be conveniently applied to mines and caverns in the earth, dungeons, priſons, and all infected places; that the ſaid invention may be uſed in hot-houſes and walls, which will greatly warm the earth, for the ſpeedy production of its fruits, and alſo in granaries for the preſervation of corn and grain; that the ſaid invention will greatly tend to the preſervation of the lives of great numbers of our ſubjects, and be of public uſe and benefit to this our kingdom in general: and as the petitioner is the firſt and ſole diſcoverer of the ſaid invention, or method, and alſo, in regard to the great expenſe of money and time the petitioner has ſuſtained, in making ſo valuable a diſcovery; he

he therefore moſt humbly prays us, that We would be pleaſed to grant him our royal letters patent, for the ſole uſe and benefit of his ſaid new invention, within that part of our kingdom of Great Britain called England, and the dominion of Wales, and town of Berwick upon Tweed, and in our plantations in America, for the term of fourteen years, according to the ſtatute in ſuch caſe made and provided: We being willing to give encouragement to all arts and inventions, which may be for the public good, are graciouſly pleaſed to condeſcend to the petitioner's requeſt. Know ye therefore, that We, of our eſpecial grace, certain knowledge, and mere motion, have given and granted, and by theſe preſents, for us, our heirs and ſucceſſors, do give and grant unto the ſaid Samuel Sutton, his executors, adminiſtrators, and aſſigns, our eſpecial licence, full power, ſole privilege, and authority, that he the ſaid Samuel Sutton, his executors, adminiſtrators, and aſſigns, and every of them, by himſelf, and themſelves, or by his and their deputy or deputies, ſervants or agents, or ſuch others as he the ſaid Samuel Sutton, his executors, adminiſtrators, or aſſigns, ſhall at any time agree with, and no others, from time to time, and at all times hereafter, during the term of years herein expreſſed, ſhall and lawfully may make, uſe, exerciſe, and vend his ſaid invention, within that part of our kingdom of Great Britain called England, our dominion of Wales, and town of Berwick upon Tweed, and our colonies and plantations in America, in ſuch manner, as to him the ſaid Samuel Sutton, his executors, adminiſtrators, and aſſigns, or any of them, ſhall in their diſcretions ſeem meet: and that the ſaid Samuel Sutton,

ton, his executors, adminiſtrators, and aſſigns, ſhall and lawfully may have and enjoy the whole profit, benefit, commodity, and advantage, from time to time, coming, growing, accruing, and ariſing, by reaſon of the ſaid invention, for and during the term of years herein mentioned; to have, hold, exerciſe, and enjoy the ſaid licence, powers, privileges, and advantages herein before granted, or mentioned to be granted, unto the ſaid Samuel Sutton, his executors, adminiſtrators, and aſſigns, for and during, and unto the full end and term of fourteen years, from the date of theſe preſents, next and immediately enſuing, and fully to be complete and ended, according to the ſtatute in ſuch caſe made and provided. And to the end that he the ſaid Samuel Sutton, his executors, adminiſtrators, and aſſigns, and every of them, may have and enjoy the full benefit, and the ſole uſe and exerciſe of the ſaid invention herein before declared; We do by theſe preſents, for us, our heirs and ſucceſſours, require, and ſtrictly command all and every perſon, and perſons, bodies politic and corporate, and all other our ſubjects whatſoever, of what eſtate, quality, degree, name, or condition ſoever they be, within that ſaid part of our kingdom of Great Britain, called England, our dominion of Wales, and town of Berwick upon Tweed, and our colonies and plantations in America aforeſaid, that neither they, nor any of them, during the continuance of the ſaid term of fourteen years hereby granted, either directly or indirectly, do make, uſe, or put in practice the ſaid invention, or any part of the ſame ſo attained unto by the ſaid Samuel Sutton as aforeſaid, nor in any wiſe counterfeit, imitate, or reſemble the ſame, nor ſhall make,

or cauſe to be made, any addition thereunto, or ſubtraction from the ſame, whereby to pretend himſelf, or themſelves the inventor or inventors, deviſor or deviſors thereof, without the licence, conſent, or agreement of the ſaid Samuel Sutton, his executors, adminiſtrators, or aſſigns, in writing under his or their hands and ſeals, firſt had and obtained in that behalf, upon ſuch pains and penalties as can or may be juſtly inflicted on ſuch offenders, for their contempt of this our royal command; and further, to be anſwerable to the ſaid Samuel Sutton, his executors, adminiſtrators, and aſſigns, according to law, for his and their damages thereby occaſioned. And moreover we do by theſe preſents, for us, our heirs and ſucceſſours, will and command all and ſingular the juſtices of the peace, mayors, ſheriffs, bailiffs, conſtables, headboroughs, and all other officers, and miniſters whatſoever of us, our heirs and ſucceſſours, for the time being, that they or any of them do not, nor ſhall at any time hereafter, during the ſaid term hereby granted, in any wiſe moleſt, trouble, or hinder the ſaid Samuel Sutton, his executors, adminiſtrators, or aſſigns, or any of them, or his, or their deputy, ſervants, or agents, in or about the due and lawful uſe or exerciſe of the aforeſaid invention, or any thing relating thereto.

And laſtly, We do by theſe preſents, for us, our heirs and ſucceſſours, grant unto the ſaid Samuel Sutton, his executors, adminiſtrators, and aſſigns, that theſe our letters patent, or the inrolment or exemplification thereof, ſhall be in and by all things good, firm, valid, ſufficient, and effectual in the law, according to the true intent and meaning thereof, and ſhall be

be taken, conſtrued, and adjudged, in the moſt favourable and beneficial ſenſe, for the beſt advantage of the ſaid Samuel Sutton, his executors, adminiſtrators, and aſſigns, as well in all our courts of record as elſewhere, and by all and ſingular the officers and miniſters whatſoever of us, our heirs and ſucceſſours, in that part of our ſaid kingdom of Great Britain called England, or dominion of Wales, and town of Berwick upon Tweed, and our colonies and plantations in America aforeſaid, and amongſt all and every the ſubjects of us, our heirs and ſucceſſours, whatſoever and whereſoever, notwithſtanding the not full and certain deſcribing the nature or quality of the ſaid invention, or of the materials thereto conducing and belonging. In witneſs whereof, We have cauſed theſe our letters to be made patent. Witneſs ourſelf at Weſtminſter, the ſixteenth day of March, in the ſeventeenth year of our reign.

By writ of privy ſeal,

COCKS.

A DISCOURSE on the SCURVY.

THE ſcurvy is a name given to ſo many diſorders of the body ſeemingly of a different kind, that it may juſtly be ſaid to be a manifold and complicated diſeaſe. The chief ſymptoms of it however are clearly deſcribed by ſeveral authors, which are ſuch as theſe: the gums rot firſt; then the ſkin is defaced with livid and black ſpots; ulcers enſue, eſpecially in the ſwelled legs; and theſe are with difficulty, if ever, cured. In the laſt ſtage of the diſtemper, even the bones become carious.

It is therefore very plain, that this malady is a kind of corruption of the blood, and the whole maſs of the bodily humours. This, when the cauſe is long continued, increaſes to a degree of putrefaction. All writers are agreed in their opinion, that it is a northern diſeaſe; imputing it to the cold and moiſt air of thoſe climates, together with the uſe of ſtagnating and ſaltiſh waters, and the unwholeſome food of hard, dried, and ſalted meats. They therefore obſerve, that it rages moſt, even to be in a manner univerſal, among the inhabitants of the Baltic ſea, in Finland, Norway, Denmark, and the places adjacent to the Germanic ocean. And indeed not only the new Latin name, *ſcorbutus*, but our Engliſh one too, is plainly made from the Saxon *ſchorbock*, or *ſchorbuck*, denoting a griping or tearing of the belly *.

This is the ſame diſtemper, which Pliny, from the ulcers in the mouth and legs, calls by the name of

* Vid. Eugalen. de ſcorbuto, & in primis Sennert. lib. iii. part. v.

ſtomacace,

ſtomacace, or rather *ſtomocace)*, and *ſceletyrbe*: aſcribing it to the drinking of bad waters; and for which, he ſays, the herba Britannica, which is our hydrolapathum, or water-dock, was found to be a remedy *.

But long before this, Hippocrates † himſelf took notice of this diſeaſe, as a diſtemper of the ſpleen, proceeding very much from cold, raw, and turbid waters.

Such is this diſtemper at land. At ſea, in long voyages, it is much more violent; ſo far, that many are of opinion, that upon the two elements it is a malady of a different kind. But it plainly appears from comparing what has been ſaid of that at land, with what I am going to mention of the ſame at ſea, that the difference is only in the degree of malignity.

The hiſtory of the progreſs of this cruel enemy is ſo judiciouſly and exactly related in Lord Anſon's voyage round the world ‡, when he came into the South ſea, where his men were in a moſt terrible manner afflicted with it, that I cannot give a more lively deſcription of it, than by taking out of this moſt entertaining and inſtructive book the moſt material circumſtances which occurred in its ſeveral ſtages. This I am the better enabled to do, becauſe being incited by the extraordinary events to make a full inquiry into this whole affair, I have not only had the honour of diſcourſing with his Lordſhip upon it, but have alſo been favoured with the original obſervations of his two ingenious and ſkilful ſurgeons ‖, from which I

* Nat. hiſtor. lib. xxv. § vi. † De internis affection. § xxxiv. & de aërib. aquis, & locis, § x.
‡ Pag. 100. &c. ‖ Mr Ettrick and Mr Allen.

have

have leave to tranſcribe whatever I find to my purpoſe.

The firſt appearances are much the ſame in the two diſeaſes at land and at ſea; but at ſea they ſoon run to a much higher degree. Nothing is more ſurpriſing than the malignity of this, as it were corroſive, poiſon exerting itſelf ſo far, that the ſcars of wounds, which had been many years healed, were often forced open again. Nay the callus of broken bones, which had been completely formed for a long time, was found diſſolved, and the fracture ſeemed as if it had never been conſolidated.

This malady was likewiſe accompanied with many other dangerous ſymptoms, particularly putrid fevers, pleuriſies, the jaundice, an obſtinate coſtiveneſs, and, at the latter end, a difficulty of breathing. This laſt was found to be the moſt deadly of them all: for it never was without ſuch a faintneſs and weakneſs, that many expired upon the leaſt motion, and endeavouring to get out of their hammocks, died before they could reach the deck.

Moreover, a ſtrange dejection of the ſpirits, with ſhiverings, tremblings, and dreadful terrours on the ſlighteſt accidents, was ſo conſtant an attendant, that whatever diſcouraged the ſick never failed to add new force to the diſtemper.

Such are the ſtrokes of this compounded calamity: and many more might be enumerated: but it is time to proceed; and to inquire into the manner by which they are produced.

It is certain, that ſuch bad diet as has been mentioned, will corrupt the blood and humours; but nothing is clearer from the whole hiſtory of this voyage, than this, that the air is, even more than any other agent, concerned

concerned in bringing on the miſchief *. It may indeed juſtly ſeem ſtrange, that the writers of phyſic ſhould not have obſerved ſo remarkable a cauſe; but they deſcribed the land-ſcurvy only. Nay, ſo great was the efficiency of the aërial fluid, that even a warmer climate did not mitigate the ſcorbutic virulency; neither did freſh proviſions, and plenty of wholeſome rain-water avail; although theſe are certainly of great importance in preſerving the body from the fatal diſorder. Of ſo much conſequence it is to reſiſt the firſt approaches of an enemy.

Now, the manner in which the aforeſaid cauſes act, is this. Whoever underſtands the uſe of reſpiration, and the way by which the ſeveral offices neceſſary to life are performed by means of it, will readily comprehend how the ſea-air acquires ſuch noxious qualities.

To ſet this in a clear light, it muſt be obſerved, that air entering into the lungs does by its gravity and elaſticity preſs upon the blood circulating in the veſſels there. The effect of this preſſure is twofold; firſt, a comminution and diviſion of it into ſmaller particles; ſecondly, ſome ſubtile elaſtic matter paſſes into the blood, and exciting in it an inteſtine motion, diſpoſes and prepares it for the ſecretions of ſeveral liquors, when, in its courſe round the body, it arrives at the glands contrived for the ſeparation of ſuch and ſuch juices.

Whatever therefore alters this gravity and elaſticity, makes the air unfit for the purpoſes for which it was deſigned. In the firſt place, moiſture weakens its ſpring; next, a combination of foul particles, ſuch as are contained in the breath of many perſons crowd-

* See voyage, p. 294.

ed

ed together, and ſome perhaps diſeaſed; then, the filthineſs of water ſtagnating in the bottom of the ſhip; laſtly, ſalts imbibed from the ſea, ſome of which may probably have proceeded from putrefied animals in that element, may inſinuate themſelves into the blood, and, in the nature of a ferment, corrupt its whole maſs. Neither is it amiſs to add, that the animal ſpirits themſelves muſt neceſſarily partake of the vitious diſorder of the fluid, from which they are derived. This is plain from that unaccountable faintneſs, and weakneſs of the body, and dejections of mind, which, as we have before taken notice, accompany the other ſymptoms.

It is needleſs to ſhew how all the enumerated complaints, and indeed many more, may follow upon ſuch a diſturbed ſtate of things, eſpecially when the other mentioned cauſes concur. It may be very ſatisfactory to put down the obſervations, which the above-named ſurgeons made upon the blood of their patients, and upon the diſſection of dead bodies, in the ſeveral ſtages of the diſtemper.

In the beginning, as it flowed out of the orifice of the wound, it might be ſeen to run in different ſhades of light and dark ſtreaks. When the malady was increaſed, it ran thin, and ſeemingly very black, and after ſtanding ſome time in the porringer, turned thick, of a dark muddy colour, the ſurface, in many places, of a greeniſh hue, without any regular ſeparation of its parts. In the third degree of the diſeaſe, it came out as black as ink, and though kept ſtirring in the veſſel many hours, its fibrous parts had only the appearance of a quantity of wool or hair floating in a muddy ſubſtance.

In

In diſſected bodies, the blood in the veins was ſo entirely broken, that by cutting any conſiderable branch, you might empty the part, to which it belonged, of its black and yellow liquor. When found extravaſated, it was of the ſame kind. And laſtly, as all other kinds of hæmorrhages are frequent at the latter end of the calamity, the fluid had the ſame appearance, as to colour and conſiſtence, whether it was diſcharged from the mouth, noſe, ſtomach, inteſtines, or any other part.

The effects we mentioned of the violence of the ſcorbutic humour being ſo malignant as to open the ſcars of old wounds, and diſſolve the calli of fractured bones, which had for a long time been formed, appear to many to be quite incredible; the rather, becauſe, as they commonly ſay, a bone thus reunited is ſtronger in that part than in any other of the ſame joint. This indeed, I dare venture to affirm, is not true in fact. The caſe is thus: A callus is no more than a kind of cementation made by filling up the ſpace between the broken ends of the bone, with the nutritious juice from the part. This, when nicely examined, is found to be more porous, and to have leſs ſolidity, though the bone often appears bigger than the part above and below it; the fibres are ſmaller, ſhorter, and not ſo regularly diſpoſed as in the natural texture. In ſhort, a callus is an imperfect oſſification. For this reaſon, when the nutritious particles themſelves have acquired a corroſive acrimony, they may, like a menſtruum, work upon and break the texture of this ſuperadded cement. Which is indeed a moſt ſurpriſing phænomenon.

It is proper after all to obſerve, as a confirmation

of this reaſoning, that although the callus is diſſolved by the diſeaſe, yet, upon the patient's recovery, it is gradually formed again, in proportion to his coming to a right habit of body. I have before me a remarkable inſtance of this kind. A ſailor had one of his clavicles fractured in December, which was immediately reduced, and ſoon united. The dreſſings were taken off in January, and he made uſe of his arm as before. In the following April, as he was ſuſpending his body by the arms, the ſame clavicle was diſunited, and the callus gave way as at firſt. He at that time complained of ſome ſymptoms of the ſcurvy; which daily increaſed till June following. At that time he was carried aſhore at the iſland of Juan Fernandez. The bandages being removed, the fracture appeared in the ſame condition as when the accident firſt happened, without the leaſt remains of a callus: notwithſtanding the proper applications, he could not uſe his arm until the middle of October; the callus having continued more than three months in a flexible ſtate. From that time, by the uſe of a vegetable diet, and living on ſhore, he gradually recovered from the diſtemper; the callus was confirmed, and his uſual ſtrength returned.

But it is time to come to the cure; which will be, firſt to prevent the attacks; and in the next place, to remove the effects of this virulent evil.

The firſt care to be taken is of the diet. And here I muſt take the liberty to make ſome obſervations upon the manner of victualling our ſhips. The trials already made, as I have been informed, of Mr Lowndes's ſalt made from brine, prove it to be much preferable, for ſalting proviſions, both fleſh and fiſh,

to

to that made from ſea-water, even to the bay-ſalt. Some experiments of its uſe I have made myſelf; and our college, being conſulted by the Lords of the Admiralty, gave their opinion in its favour. There is in this nothing of that noxious quality, whatever it be, which is always found in the marine ſalt, and cannot, by any known methods, be ſeparated from it; and which, as we ſee, makes the ſea-air, as well as its water, unwholeſome. And I cannot but ſay, that I am ſorry to ſee ſome of our phyſicians, of late years, ſo fond of preſcribing the drinking of it to their patients, particularly in ſcrophulous diſtempers. I am well aſſured, that it has ſometimes brought on ſcorbutic ſymptoms, beſides other miſchiefs.

I muſt add, that if, inſtead of our ſalt-fiſh, ſtock-fiſh, which is dried without any ſalt, were provided, it would be more wholeſome. The Dutch do ſo; and alſo, in lieu of oatmeal, they put on board gort, which is, as I have been informed, a kind of barley ground; and is not ſo hot and drying as oatmeal.

I will here relate what that experienced and brave admiral, Sir Charles Wager, once told me in a diſcourſe I had with him concerning the health of our ſeamen. He ſaid, that one year, when he commanded our fleet in the Baltic, his ſailors were terribly afflicted with the ſcurvy: but he obſerved that the Dutch ſhips, then in company with ours, were much more free from this diſeaſe. He could impute this to nothing but their different food, which was ſtock-fiſh and gort; whereas ours was ſalt-fiſh and oatmeal. He was then come laſt from the Mediterranean, and had, at Leghorn, taken in a great quantity of lemons and oranges. Recollecting, from what he had often

heard, how effectual these fruits were in the cure of this distemper, he ordered a chest of each to be brought upon deck, and opened every day. The men, besides eating what they would, mixed the juice in their beer. It was also their constant diversion to pelt one another with the rinds; so that the deck was always strewed and wet with the fragrant liquor. The happy effect was, that he brought his sailors home in good health.

It is very commonly known, that, in our East-India ships returning home, the men are very much affected this way, and that upon their very approach to the island of St Helena, they are strangely relieved by the fresh odoriferous air; and perfectly recovered, after some days, by eating the fruits we have mentioned, and living chiefly upon the vegetables, which kind nature has supplied that place with in profuse plenty.

What has been said may serve for a very good proof of the reasonableness of the advice given some years ago, by our college, to the Lords of the Admiralty, viz. that a quantity of wine-vinegar should be allowed to the company of every ship. This qualifies the salt of the food, and makes some amends for the want of sub-acid fruits. But I must remark, that the vinegar of strong beer has neither the flavour nor the virtue of that from wine; and ought indeed to be forbidden our tables.

I shall conclude what I have to say with regard to feeding on herbs, in the scurvy, with a remarkable relation, contained in a book published, not many years since, by a Dutch physician, on this subject *.

* Observationes circa scorbutum; auctore Johanne Fred. Bachstrom. Lugduni Batavor. 1734. 12mo. p. 8.

A ſailor, in one of the Greenland ſhips, was ſo entirely broken and diſabled by this diſeaſe, that his companions, when the fiſhing was over, put him into a boat, and ſent him aſhore; leaving him there to periſh, without the leaſt expectation of a recovery. The poor wretch had quite loſt the uſe of his limbs; he could only crawl about upon the ground: this he found covered with a plant, which, having nothing elſe to ſupport life, he, continually graſing like a beaſt of the field, plucked up with his teeth. Every country is, by the bounty of Providence, provided with antidotes againſt the diſeaſes to which its inhabitants are chiefly liable. In a ſhort time, he was by this means perfectly recovered to his ſtrength, and, after his return home, related the fact to this writer. It was ſoon after obſerved, that this herb was cochlearia, or ſcurvy-graſs. Some of it was, for inquiry's ſake, brought over hither in pots, and was found to be ſomewhat different from that of our country, being more mild, and not ſo pungent and ſharp.

Thus much for the vegetable diet. I muſt add, that beſides the herbs and fruits mentioned, there are many others very wholeſome in this diſeaſe: ſome like cochlearia, of a ſubtile and volatile juice, as the naſturtium, beccabunga, or brooklime; others more cooling, and therefore more proper in hot conſtitutions, or feveriſh heats, as ſorrel, endive, lettuce, purſlain, &c. And, indeed, I think it will be beſt to join in uſe the hotter with the colder, that they may qualify each other; eſpecially, becauſe the acid fruits were found, in Lord Anſon's voyage, to be of moſt extraordinary benefit *.

* See voyage, p. 117. and alſo 308.

Neither

Neither ought it to be omitted, that milk of all kinds, when it can be had, and its whey, which may be clarefied with ſome of the herbs now named, is an antiſcorbutic food and phyſic.

But, as the deſign of this diſcourſe is to demonſtrate the uſefulneſs of the preceding machine, it will be right to add ſome illuſtrations and obſervations to thoſe I formerly made in my paper read before the Royal Society, and reprinted in Mr Sutton's book *.

I have already taken notice, that the reaſon why the writers upon this diſeaſe have not aſcribed it more to the air, than they have done, muſt be, becauſe they were more acquainted with it at land than at ſea. Now, it is very plain, that as the hurtful qualities of the ſea-air muſt be heightened by its being cloſely confined, without due circulation, particularly when it is alſo ſaturated with effluvia from the breath of many perſons almoſt ſtifled up together; ſo the continual ſhifting and changing of this element, muſt of courſe be attended with great advantages; nay ſuch perhaps, as one unacquainted with the nature of things, would hardly be brought to believe. But I refer to my mentioned paper, and Mr Sutton's additions.

I muſt laſtly remark, that it is almoſt incredible how ſoon the ſick, even though juſt dying, begin, when brought aſhore, to feel the ſalutary effects of the land: for whereas the Commodore had buried twenty-one men in two days, before his arrival at the iſland of Tinian, yet he did not loſe above ten, during his two months ſtay there †. For ſo healing, and contrary to the malignity and bad qualities of the ſea-

* Above, p. 220. † See voyage, p. 307.

air,

air, was that of the land, that the patients, even upon their being expoſed upon the ground, immediately recovered.

But it may ſeem ſtill more marvellous, that the vapour of the cold earth itſelf ſhould alſo contribute to their ſpeedy recovery. Lord Anſon told me, that one of his men, who rowed the boat aſhore, was ſo weak, that he fell down at the oar almoſt dead: when landed, the poor man deſired his mates that they would cut a piece of turf out of the ſoft ground, and put his mouth to the hole: upon doing this, he came to himſelf, and grew afterwards quite well. This puts me in mind of what I have formerly ſeen done by the boys on Shrove-Tueſday, the too cruel anniverſary martyrdom of cocks; when one of theſe creatures was knocked down and expiring, it was ſometimes brought to life again, by inſtantly putting its head, for a ſhort time, into a freſh-made hole in the earth.

This ſudden good effect of freſh air affords a plain proof of what we have before ſaid, that, beſides the blood, the animal ſpirits themſelves are very much affected in this diſeaſe: for ſuch immediate relief could only be given by the means of this active fluid, the main inſtrument of all vital motions. And as the protracting this advantage in the open air is the cure at hand; ſo the making a conſtant circulation even of that which is not ſo wholeſome, in the ſhip, muſt do a great deal towards the prevention of the diſtemper.

R. M.

The End of the SECOND VOLUME.